

The Dock and Harbour Authority

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DECEMBER, 1937

Editorial Comments

The Australian Harbour Conference.

Although the eighth Inter-state Conference of Australian Harbour Authorities, held at Parliament House, Sydney, took place at the beginning of last April, a detailed report of the proceedings has only just come to hand. The Conference lasted four days, and a great variety of subjects came under discussion; a large proportion of them, as might be imagined, were of purely local concern and, therefore, do not call for notice by English authorities. But a few matters stood out as having a wider appeal, and to these we propose to refer briefly, it being impossible within the limits of space at disposal to give the discussions in extenso.

The opening address of the Hon. E. S. Spooner, Minister for Works and Local Government, an abridgment of which will be found elsewhere in this issue, included a survey of the relations between the Commonwealth, the States and the Harbour Authorities, in which the view was expressed that for the present the division of functions between Federal and State authorities appears to have proceeded as far as is necessary for the efficient control of the ports, and of the shipping that uses the ports.

The question of making regulations for the control of air craft in harbours was referred to the Permanent Committee for appropriate action, when the Commonwealth and State policy in regard thereto had been finally defined.

As regards the standardisation of conditions under which the handling, or conveying, of large quantities of inflammable liquids on wharves and vessels in the busy areas of a port was permissible, it was decided (a) that quantities not exceeding 50 tons of inflammable liquids (Group A) should be permitted to be conveyed or handled in a busy area between sunrise and sunset, provided that, if landed, they were removed from the wharf within two hours and were completely removed by sunset, and (b) that inflammable liquids (Group B) should be permitted to be conveyed or handled, provided that, if landed and not removed by sunset, a watchman be placed in charge. The distinction between liquids in Group A and in Group B is that those in the former class have a true flashing point lower than 73 degrees Fahr., while in the latter, the true flashing point is not less than 73 degrees Fahr. Inflammable liquids are all those with a true flashing point below 150 degrees Fahr.

Except with the written permission of the proper authority, the master, owner or agent, the Conference decided not to countenance the use of wire ropes for the mooring of tank ships.

Gross tonnage was accepted as the future basis on which all pilotage rates are to be levied, coupled with the adoption of minimum and maximum charges. There is considerable diversity of practice in Great Britain in this respect. Pilotage is sometimes charged on "footage" or draft, sometimes on the gross tonnage, sometimes on both, and occasionally on the net tonnage. It is doubtful whether the variable conditions here would admit of the adoption of a general standard basis, as in the case of Australian harbours.

As regards oil pollution of harbour waters, the Conference considered the establishment of zones (as suggested by the League of Nations) within which vessels were not to be allowed to discharge oily substances, as unnecessary in waters contiguous to the Australian coast. They further recommended that Port Authorities of the Commonwealth should refrain from providing

oil-separating equipment; and that the provision of this equipment should be made compulsory on oil-burning and oil-carrying vessels. Stress was laid on the experience of harbour authorities in other countries, where the appliances provided were neglected and the authorities involved in costs which were irrecoverable.

The question of a uniform system of buoyage was dealt with so ably and comprehensively in an address by Mr. A. D. Mackenzie, the Engineer in charge of Ports and Harbours of the State of Victoria, that we feel it desirable to reproduce it in full in a subsequent issue. The matter is of universal importance, and a good deal of Mr. Mackenzie's argument is of general application. The matter was eventually referred by the Conference to the Permanent Committee for further investigation, and for the adoption of such course as it might consider desirable.

The next Conference is to be held at Hobart, Tasmania, the date being decided later. It was announced that the Conference has been admitted to honorary membership of the Dock and Harbour Authorities' Association of the United Kingdom. This follows the admission of the Harbours Association of New Zealand to the same status.

The Manchester Ship Canal Anniversary.

A particular interest, from a port point of view, attached to last Armistice Day, for on November 11th it was just fifty years since the first sod of the Manchester Ship Canal was turned by Lord Egerton of Tatton, at that time Chairman of the Canal Company. The circumstances were far from propitious, and very formidable difficulties, both financial and technical, had to be overcome before the undertaking could be brought to a successful completion. It was not until January 1st, 1894, that the canal was opened for traffic with the passage of 71 vessels through the Eastham Locks. The official opening by her late Majesty, Queen Victoria, took place during the following summer.

The memories of the vehement opposition aroused by the project at the time of its inception, and the strenuous exertions of its promoters to carry the enabling Bill through Parliament, are now becoming faint as the years go by and the agitation of the period fades into the remote past; for all the great protagonists of the struggle have regrettably disappeared from the scene of human affairs. Mr. Daniel Adamson, the pioneer of the undertaking, Sir E. Leader Williams, the engineer, and their colleagues, upon whose shoulders rested a burden of immense responsibility, which they carried courageously through years of anxiety, are no longer here to witness the triumphant realisation of their dreams. Their successors, and the world generally, pay a tribute of respectful admiration to their "grit" and determination.

The construction of the Ship Canal undoubtedly was a great and epoch-making achievement, and Manchester has every reason to be proud of the initiative and enterprise of her citizens, who, despite all obstacles, have made the city a seaport for ocean-going vessels, bringing the wares and products of the world direct to her quays and warehouses.

It is appropriate in this connection to call attention to a lecture on "The Manchester Ship Canal," which is being delivered to the Society of Arts in John St., Adelphi, on December 1st, by Vice-Admiral Sir H. P. Douglas, K.C.B., C.M.G., the Acting Conservator of the River Mersey.

*Editorial Comments—continued***The Port of London Authority and the Wharfingers.**

Towards the end of October, Sir David Owen, General Manager of the Port Authority, at a meeting of the Mansion House Association on Transport, explained the proposals of the Port Authority relating to the registration of warehouse-keepers and premises on the river front, as he had previously done at a meeting of the wharfingers, to which allusion was made in last month's issue. No report of the earlier meeting was available for publication, but the substance of the Mansion House address will be found on another page of this issue.

It is perhaps only natural that the wharfingers and warehouse-keepers of the metropolis who have so long enjoyed freedom from supervision of any kind in regard to their operations and charges, should look askance, and with a considerable degree of suspicion, at proposals which appear to threaten their independence and bring them within the jurisdiction of an overriding authority. They see in the action of the Port Authority an attempt to limit the range of their activities, and to subject them to a control which, from their point of view, is not altogether disinterested, since the Authority themselves have a very important warehousing business, upon which the Authority depend for a not inconsiderable part of their revenue.

On the other hand, the Authority, upon whom is laid the responsibility for maintaining and improving the accessibility of the port, and so of furthering the interests of all who are engaged in its commercial operations, contend that they should not be subject to unrestricted competition, with lack of uniformity in charges and wages. Already they possess power to license works and premises below the level of high water, and they consider it equitable that the principle should be extended to cover the licensing and registration of all riverside premises, and therewith the imposition of conditions as to the payment of standard wages and the making of adequate charges for services rendered.

As our readers will see from articles in the last and present issues of this journal, the Authority are incurring very considerable expenditure on the development of the port accommodation, and this entitles their proposals to fair and reasonable consideration, but whether the wharfingers will accept the arguments put forward is a matter which can only be decided by themselves. From the account which is given elsewhere in this issue of the November meeting of the Mansion House Association on Transport, there is clearly a good deal of opposition to be expected from the new association of wharfingers which has recently come into existence, and, in fact, has arisen out of the present situation. As we go to press we learn that it is not the intention of the Authority to proceed with their Bill in the present session of Parliament, but to afford time for closer consideration of its provisions, in the hope that there may emerge therefrom a measure acceptable to all parties.

The American Port Authorities' Convention.

The Annual Convention of the American Association of Port Authorities, which was held this year at Wilmington, in the State of Delaware, during the month of October, is a noteworthy event, which merits attention for its inherent importance, and should not be without interest to port officials on this side of the Atlantic. The occasion marked the 26th year of the existence of the Association, and the programme of the proceedings showed vigorous activity on the part of the organisers and unabated interest among the members. After ceremonial addresses of welcome from the Governor of the State of Delaware, the Mayor of the City of Wilmington and the President of the local Board of Harbour Commissioners, the Convention proceeded for several days to listen to, and to discuss, a number of papers and addresses on various topics connected with port affairs. We hope, at a later date, to be able to reproduce some of these papers, since, while dealing with problems which are essentially American in incidence and scope, they have certain points of contact with similar problems in other countries, and, in any case, they serve to widen the range of knowledge and experience.

The atmosphere of these conventions, as befits American tradition, is very open and friendly and, therefore, perhaps a little freer and less formal than that of similar gatherings in this country. Speaking from the recollection of a Convention which we had the privilege of attending fifteen years ago, the proceedings were conducted in a buoyant and optimistic spirit, and with a local pride and loyalty which manifested itself occasionally in slightly exuberant propaganda. At the same time, it must be admitted that the infusion of a little enthusiasm into "selling the port" (as the American phrase goes), provided it is kept within reasonable bounds, is not without advantage, and however much the expression of the sentiment may be withheld or ignored, the consciousness of the prestige and importance of their own port is, or ought to be, at the back of the minds of those whose duty it is to promote the interests of their respective undertakings.

Lloyd's Register of Shipping.

The appearance of the Annual Report of Lloyd's Register of Shipping is always a notable incident in the yearly output of publications dealing with maritime affairs. The Register stands so high in the estimation of the shipping world that its statistical tables and reports have acquired a definite status of international importance. Over 31 million tons of shipping, or nearly half the world's mercantile fleet, hold the classification of the Register, represented by the universally known symbol *AR*, which, in fact, has passed into a familiar proverb, so that "*AR* at Lloyd's" stands for excellence in general.

The Annual Report for the year ended June 30th, 1937, shows that during the twelve months the Society's classification was assigned to 484 new vessels of a gross tonnage of 1,355,680, representing approximately 60 per cent. of the world tonnage completed during the period. Of this total, 734,480 tons were constructed in Great Britain and Ireland, and 621,200 tons in countries abroad.

Of the tonnage of merchant vessels afloat at the end of June, 1937, 30,816,955 gross tons appertained to those vessels which held the classification of Lloyd's Register. Of these, 4,384 vessels of 13,230,645 gross tonnage belonged to Great Britain and Ireland; 542 vessels of 1,389,433 tons to the British Dominions, and 3,898 vessels of 16,196,877 tons to other countries.

The Report records a marked improvement in the shipping position, due to the sharp rise in freights, which has resulted in a corresponding increase in the value of vessels, many of which, after having been laid up for some considerable time, have been re-commissioned and put into service again.

Although the liner business has shared in the general prosperity, the slight increases from year to year in world passenger traffic are insufficient to induce liner companies to proceed further with their shipbuilding programmes at the present high scale of cost. This important factor in the shipbuilding situation has already been the subject of comment in these columns, and it is one which will be noted by port authorities.

Another Thames Tunnel.

The recommendation of the Highways Committee to the London County Council, which has been adopted by the latter body, that a duplicate of the Blackwall Tunnel should be constructed at a point about 800-ft. downstream of the existing tunnel, and that Parliamentary powers should be obtained for the purpose, will not occasion much surprise and will, indeed, prove welcome to those who have had to deal with the cross-river traffic and have experienced the congestion which attends the present inadequate facilities. The Ministry of Transport recognises the difficulties of the situation, and fully agrees as to the necessity for an additional tunnel, towards the cost of which (rather more than three million pounds), it is prepared to make a very substantial contribution, viz., 75 per cent. of the cost of the tunnel itself, and 60 per cent. of the cost of the approaches.

Whether tunnels or bridges are the better means of cross-river connection has always been a moot point, and each system has its particular merits according to local circumstances. A high-level bridge at Woolwich was, in fact, considered as an alternative scheme in the present instance, but the Committee rejected it as insufficient to relieve to any appreciable extent the congestion in the vicinity of the Blackwall and Rotherhithe tunnels. Moreover, they were influenced by the consideration of the vulnerability of a bridge in case of air attack.

From a port point of view, a river tunnel has the disadvantage of acting as a definite sill for shipping and as a barrier to the deepening of the navigable fairway, but in the present instance, the situation is governed by the existence of the Blackwall Tunnel, and in any case, the depth available for dredging is well within the limits laid down in the Port Authority's programme of river development, and should be adequate for the needs of shipping passing into the Pool of London and the upper docks.

Institution of Civil Engineers:**Vernon-Harcourt Lecture.**

At the invitation of the Council of the Institution of Civil Engineers, the Vernon-Harcourt Lecture for 1937-8 will be delivered by Dr. Brysson Cunningham, M.Inst.C.E., on December 8th, at the Institution, Great George Street, S.W.1, at 6.15 p.m. The subject of the lecture will be "Estuary Channels and Embankments." Subsequent to its delivery in London, it will be repeated at the following provincial centres: Manchester (December 15th), Newcastle (January 11th, 1938), Sheffield (January 12th), Birmingham (February 10th), Glasgow (February 25th), Belfast (February 28th), Cardiff (March 30th), and Bristol (March 31st).

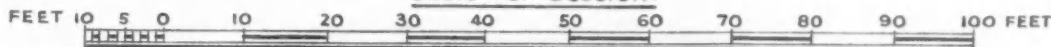
DOCKS MODERNIZATION SCHEMES FOR THE PORT OF LONDON.

(PART 2.)

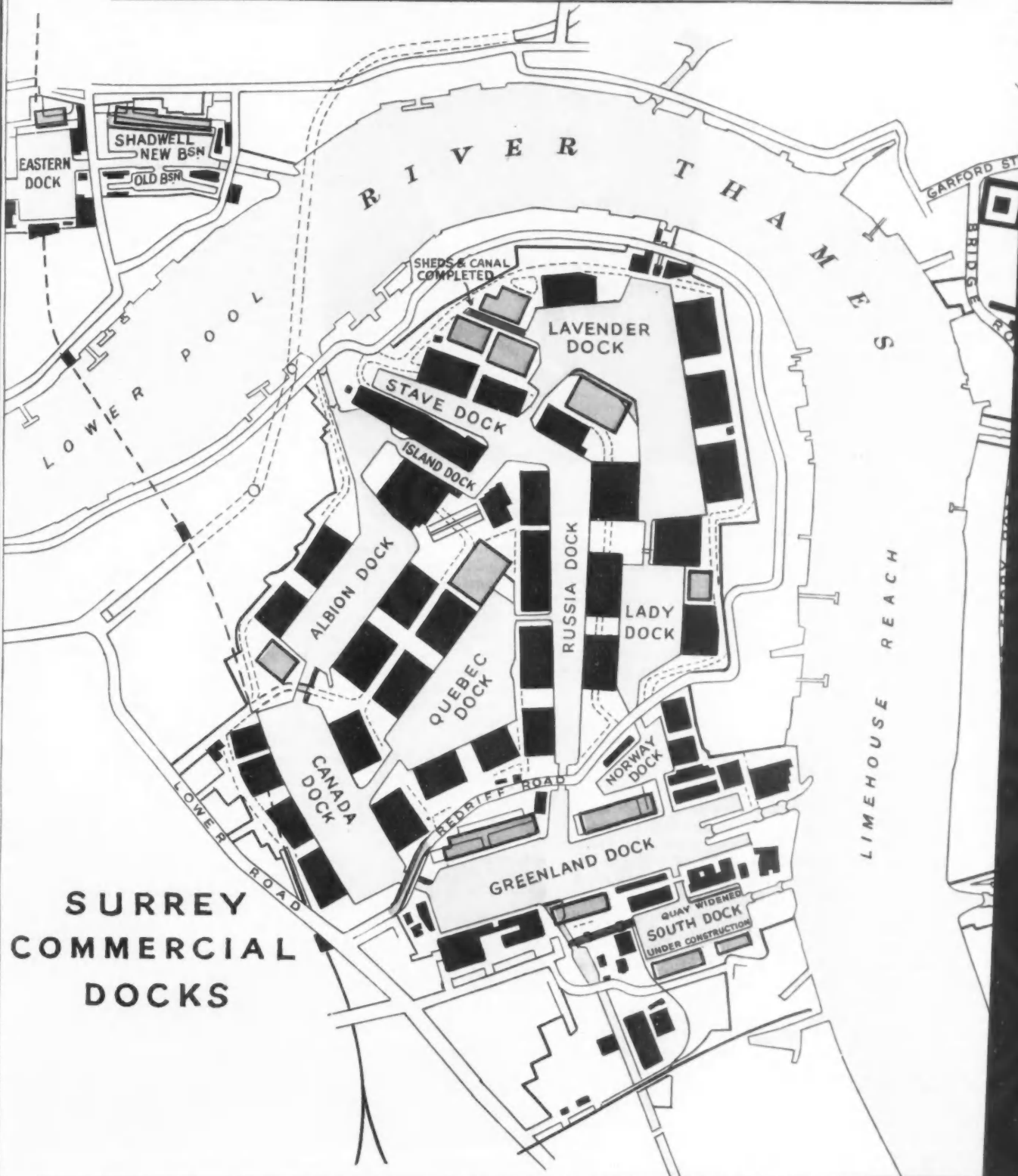
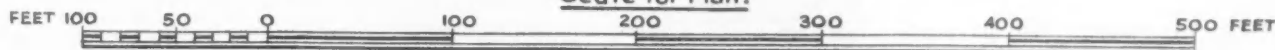
GENERAL MANAGER TO THE PORT OF LONDON AUTHORITY;—SIR DAVID OWEN.

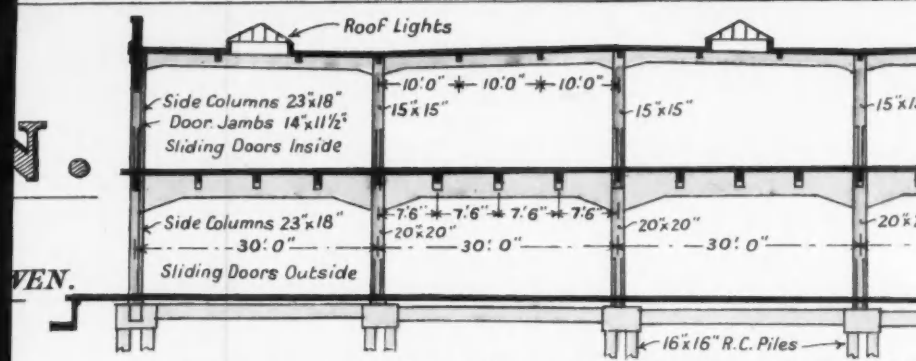
CHIEF ENGINEER;—ASA BINNS ESQ., M.INST. C.E..

Scale for Section.

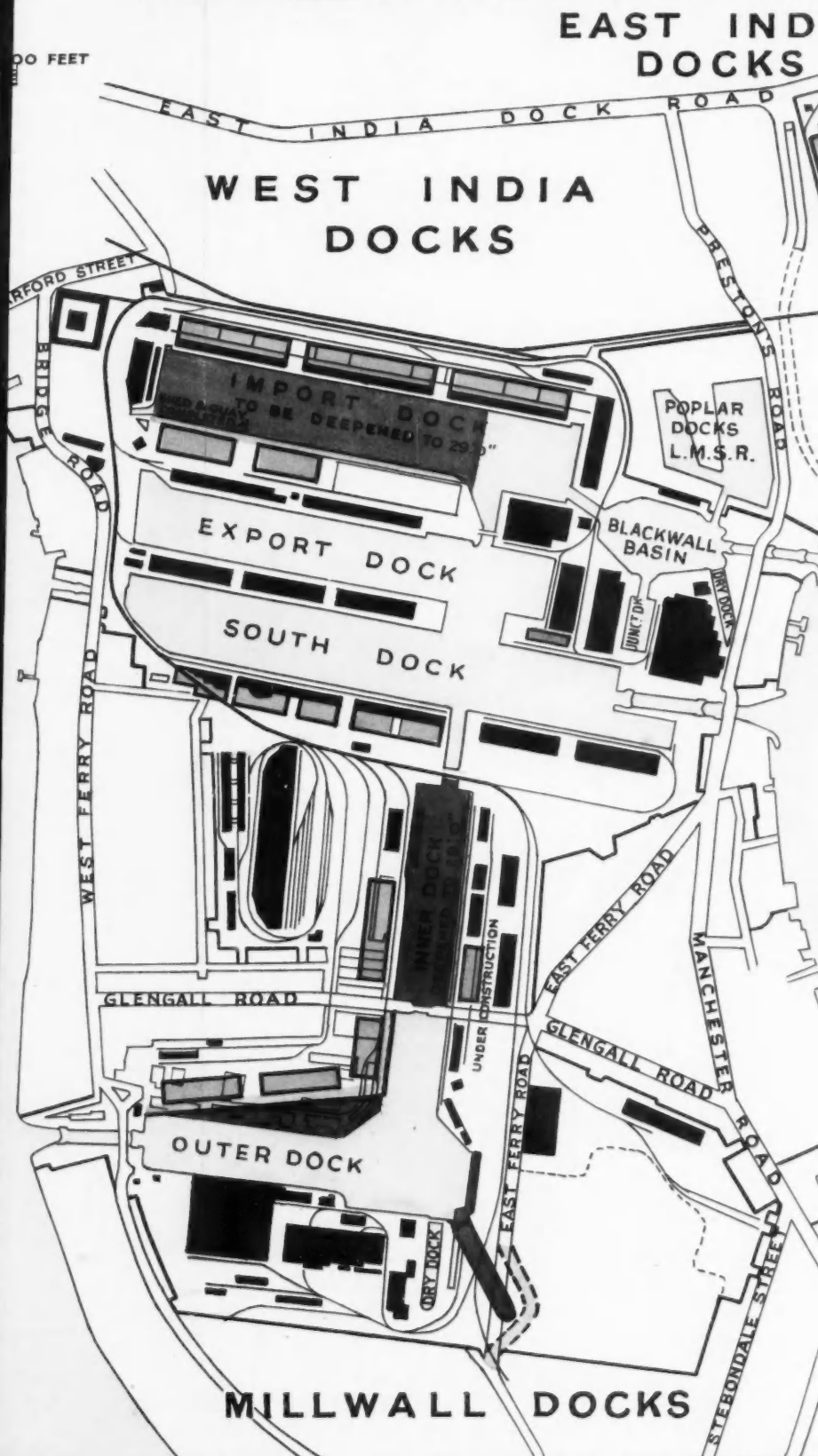


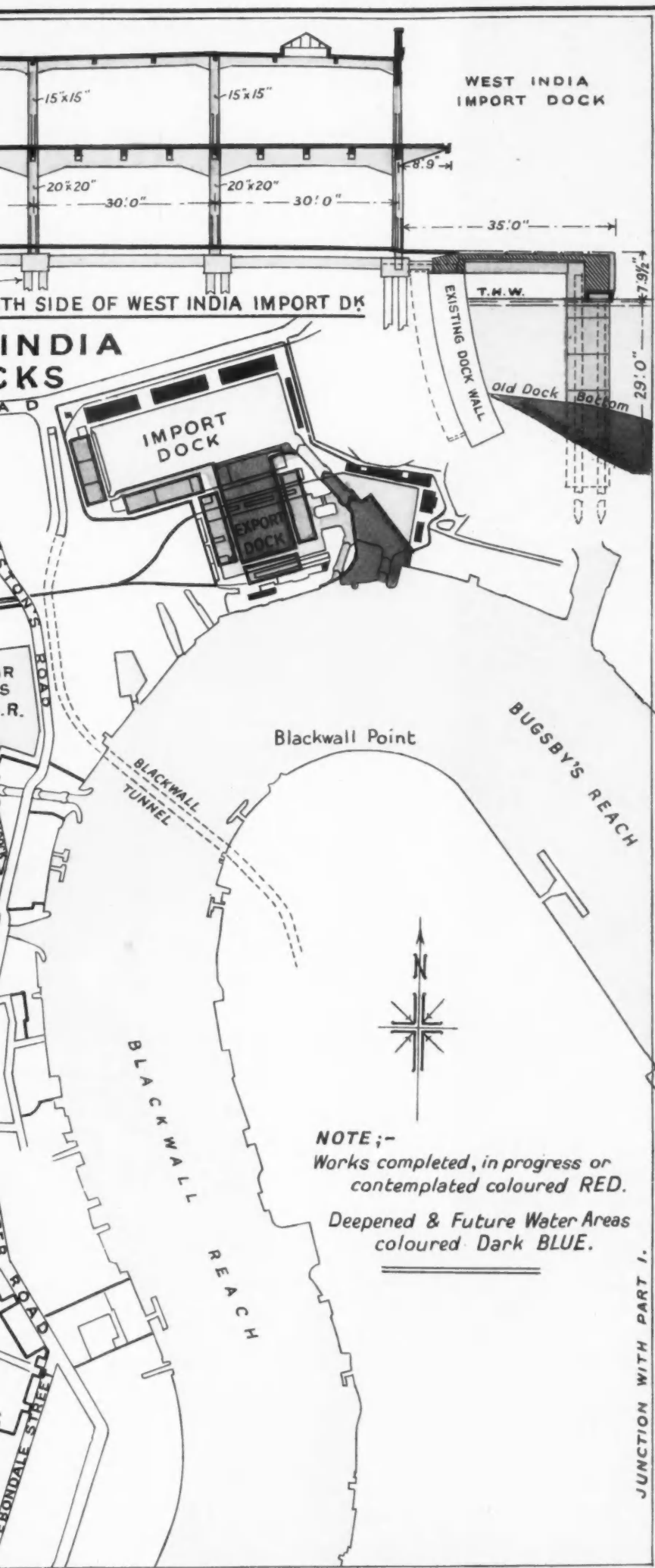
Scale for Plan.





CROSS SECTION OF NEW QUAY & SHED - SOUTH SIDE





Port of London Developments

An Account of Important Improvement Schemes in hand

By Sir DAVID J. OWEN, General Manager, Port of London Authority

(continued from page 8)

IN this second and concluding section of the article on improvement works by the Port of London Authority, it is proposed to deal with the developments other than those at the Royal group of docks which were covered in last month's issue.

The West India Docks

The West India Import and Export Docks were built by the West India Dock Company and opened in 1802 to accommodate, as the name implies, the shipping and produce of the West Indies, sugar and rum forming the bulk of the cargoes. A feature of the former dock is the fine range of original five-storey warehouses on the north quay, in the basements of which still remain the stone floor channels cut to receive the syrup that drained from the sugar puncheons.

Some years after the opening of the dock, the Dock Company acquired the City Canal, which had been constructed between Limehouse Reach and Blackwall Reach by the Corporation of London with the object of saving navigating time around the Isle of Dogs. By widening the canal the present South-West India Dock was formed. The Millwall Dock, until recently quite separate from the India Docks system, was opened in 1868, but in 1926 connecting cuts were made between the West India, South-West India and Millwall Docks, so that all of these docks could reap the benefit from the reconstruction and enlargement of the South-West India Lock, which was being carried out at the same time. It is a tribute to the foresight of the designers that the main docks in this system, although constructed so many years ago in the days of sailing ships, have been able to retain many of their original characteristics in catering for modern steamships.

As a first step in the modernisation of the south quay of the West India Import Dock, old open sheds at the western end which were used for the storage of hardwood, have been demolished, and a new double-storey shed, 430-ft. by 150-ft., is now practically completed. The framework, floors and flat roof of this building are of reinforced concrete, with brickwork panels. It is to be used for the discharge, storage and distribution of produce from the Canary Islands, principally bananas. Designed to carry a super-imposed load of 3 cwt.

per sq. ft., part of the upper floor will be used for the storage and conditioning of the fruit. Improved road and railway access are to be available.

Owing to the method of construction of the quay wall on the south side of this dock, it is not possible to provide a greater depth of water than 20-ft. alongside the quay. A false quay, 25-ft. wide, has therefore been built, in order that by dredging a depth of 20-ft. below T.H.W. may be attained.

In the Supplement will be seen a cross-section, showing the construction of the false quay in front of the old walls at the West India Import Dock, which is typical of the false quays built at the Royal Albert Dock and at other places where the old walls are utilised and made to do still further service.

The concrete columns shown are spaced 24-ft. apart, and built up with cylindrical shells 7-ft. by 5-ft. and walls $4\frac{1}{2}$ -ins. thick, in lengths of about 8-ft., which are sunk by open grabbing and the occasional use of kentledge to the required depth below the future dock dredging level.

Two or more reinforced concrete piles are driven inside, according to the loading to be imposed, and the cylinders are then filled with concrete deposited in hopper bottom skips, the filling of each cylinder being completed up to the water surface without interruption.

To prevent the under-slaying of barges, the coping beam, which carries the front crane rail, is built on pre-cast longitudinal beams extending below the water line, which is maintained at a constant level.

The transverse beams are spaced 8-ft. apart, and the lower portions pre-cast to support 3-in. pre-cast concrete slabs to receive the 12 in. decking slabs, deposited in situ, on which the crane and railway track are laid, and the paving concrete completed flush with the top of the rails with granolithic surfacing.

The reinforced concrete used throughout is a 1:2:4 mixture, except in piles and pre-cast beams, in which the proportions are 1:1:3, the cylinder hearting being of ordinary Thames ballast concrete, with 600 lbs. cement to the cu. yrd.

The coping beam is faced with granite concrete 12-in. thick, deposited simultaneously with the rest of the beam. The false quays are designed to take, in addition to the movable cranes weighing up to 78 tons, railway lines in any position and the heaviest road vehicles.

As the cost of providing a subway in false quays for electrical and other services is prohibitive, the electrical mains and crane plug boxes are attached to the walls of the shed, under cover of the projecting landing balcony. Each crane plug box contains circuit breaker, fuses and interlocking switch, from which flexible cable is led in a narrow groove across the quay formed by two bulb angles in the concrete paving and thence along the flange-way of the track up to the crane. This arrangement frees the quay of a multiplicity of conduits, pits and hinged covers, and the attendant dangers of electrical apparatus installed beneath a quay surface.

The fresh water mains are suspended beneath the transverse beams, and hydrants are provided at intervals in pits formed on the shoulders of the cylinder columns.

It is intended, in carrying out the first stage of the scheme, to extend the false quay which has just been described a further 1,300-ft. to the eastward, and to erect a five-storey warehouse on the site of No. 2 Rum Quay Shed. With the necessary dredging to provide an additional deep-water berth, it is estimated that the work



Photo] [Lafayette
Mr. ASA BINNS, M.Inst.C.E., M.I.Mech.E.,
Chief Engineer, Port of London Authority



Barge Canal, 600 ft. long and 60 ft. wide, between Ranges of New Timber Storage Sheds at Lavender Dock, Surrey Commercial Docks.

Port of London Developments—continued

will cost £240,000. This phase, however, has not yet been embarked upon.

The Millwall Docks

Millwall Dock has not received a great deal of attention in the way of improvements during the life of the Authority, the only outstanding items being the enlargement of the dry dock to 547-ft. in length, and the connection to the India Docks already referred to. It caters for the rather smaller type of steamer with general cargoes, although the fine granary, equipped with pneumatic elevators and silo installations owned by the Authority, and the flour mills erected by McDougalls, Ltd., attract considerable grain cargoes. On the south side of the dock a large area with quay space has recently been leased to a timber importing concern, who are erecting storage sheds and a saw mill.

It has now become necessary to remodel portions of the quay on the eastern side of the Inner Dock, and the Authority have decided to reconstruct the complete length of the quay wall measuring 1,310-ft. In this case, as the comparatively narrow width of the dock would not permit of quay widening, steel sheet piling will be driven immediately in front of the toe of the wall and anchored back to land ties. This will enable the dock to be deepened a further 5-ft. to 20-ft. alongside the quay. A contract for this work has recently been entered into, including the building of a new 2-storey warehouse to replace an obsolete shed, at a total cost of £110,000.

The Surrey Commercial Docks

To Surrey Commercial Docks, the only group on the south side of the river, belongs the distinction of including in its system the oldest enclosed wet dock constructed in London. As far back as 1696, the Howland Great Dock was built, in which vessels could be discharged and loaded whilst remaining afloat. Some years later, it was adapted to suit the requirements of vessels engaged in the whaling trade, and its name became changed to Greenland Dock, a name still retained for a part of the Surrey Docks system. Its original construction compared strangely with modern ideas, for no warehouses were included, and rows of trees were planted round the quays with the idea of providing the sailing vessels with some protection from the wind. When the whaling industry declined, the dock became the haven for corn and timber-laden vessels. In 1810, the Commercial Dock Company, who had acquired the Greenland Dock, together with Norway Dock which had been built close to it, purchased certain ponds which were formed for the purpose of storing timber.

By 1864, the various ponds and docks, including the Grand Surrey Canal, which is connected to the Greenland Dock, had



Entrance to South West India Dock.

come under the management of the Surrey Commercial Dock Company. It is an interesting fact that the canal was intended to be carried out to Clapham, Croydon, Kingston, Ewell and Epsom, while it was even suggested that it might be extended as far as Portsmouth, but actually it was constructed only to Camberwell, with an arm to Peckham, a total length of four miles.

When the Authority took over the concern in 1909 the network of docks and ponds had grown to something like the system shown in the plan of the docks, but much development has since taken place. In view of the growth of the timber trade, which is the chief business carried on at these docks, and the general desire of the merchants to have the timber stored under cover instead of in the open at the mercy of the weather, some of the shallow ponds have been filled in, others converted into the present Lavender Dock and Quebec Dock with a considerable increase in the effective quay space, while numerous fine ranges of storage sheds have been erected on various sites in the system. A feature of the most recent additions is a barge canal, 60-ft. wide, between new ranges of sheds at the Lavender Dock. This facility enables a number of barges to be discharged simultaneously and the timber delivered direct to covered accommodation.

It may be of interest to quote here that in the year ended 31st March, 1937, the total imports of wood, hard and soft, into the Port of London amounted to nearly three million tons, of which 2½ million tons were discharged in the docks. The quantity handled by the Authority across their own quays was 600,000 tons, the Surrey Commercial Docks alone dealing with nearly 500,000 tons. The balance not received by the Authority was either taken to tenants' premises in the docks or delivered

overside to craft for conveyance out of the dock.

Other business regularly handled at the Greenland and South Docks includes Canadian produce, such as apples, cheese, bacon, etc., and trade from the Baltic ports. Goods requiring cold storage are accommodated in two blocks of refrigerated warehouses with a combined capacity of 2,000,000 cu. ft. There has been an extraordinary increase during the past few years in shipments of plywood, laths, etc., from Finland, and in response to the demand by the merchants for additional accommodation the Authority have just completed certain improvements to No. 2 Warehouse, South Dock, a building of six floors, formerly used for grain, to adapt it for more general merchandise. The quay has been widened 19-ft. for a length of 400-ft., and quay cranes have been installed to form an additional ship-discharging berth. These cranes land goods direct from vessel on to any floor of the warehouse. The quay widening is of reinforced concrete, supported on concrete cylinders and piles, and allows for a variation of



General View of Millwall Dock, looking South. The Quay on the left, as far as the Road Bridge, is part of the East Quay to be remodelled.

Port of London Developments



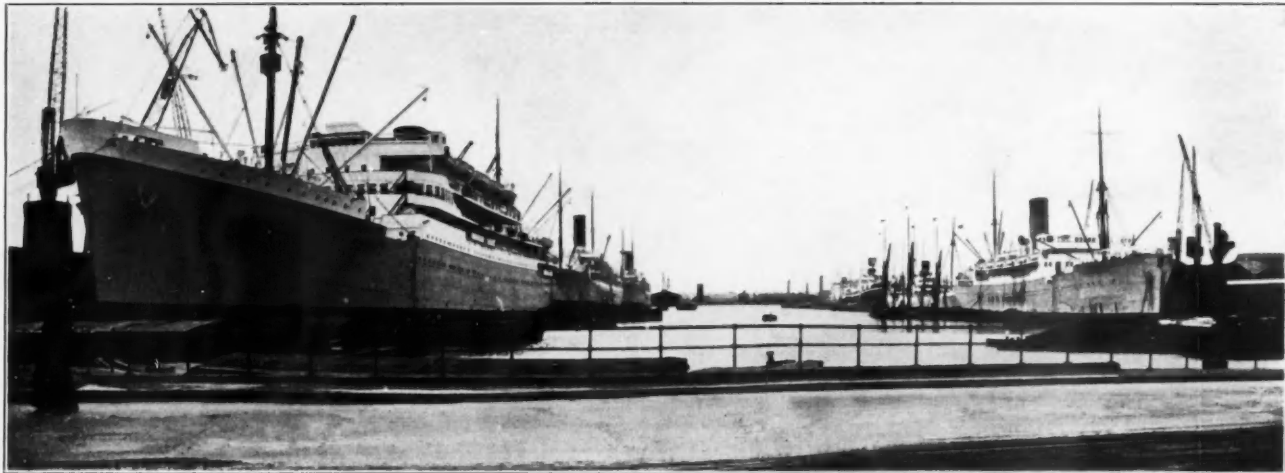
[Photo]

Tilbury Passenger Landing Stage. Royal Mail Liner Arriving.

[Beckley]



Quay Widening, West India Dock, in front of old Dock Walls.

Port of London Developments—continued*General View of Shipping, West India Docks.*

4 to 5 feet in water level, because the water in this dock is lowered to permit vessels to enter or leave the dock on the same level as the river about two hours before high water.

On the south side of South Dock, No. 1 Warehouse, used for the storage of plywood and general cargo, which was completely gutted by a spectacular fire in the early part of last year, is being replaced by a four-storey building, 270-ft. by 85-ft. At the same time, on the adjacent site to the west, a new four-storey warehouse (360-ft. by 120-ft.) is being erected in place of the existing obsolete shed of small capacity, and the quay surface and roads will be reconstructed. A contract for these works has been entered into, and the cost, together with road improvements, will be about £190,000. These buildings will be of the same type, that is, reinforced concrete framework in bays of 24-ft. longitudinally, the panels being of red pressed brickwork. The concrete flat roof will have raised lantern lights glazed with non-actinic glass. Each floor will possess the advantage of fire separation, and be capable of carrying 3 cwts. per sq. ft. Crane loops are provided in each bay on the quay side, and on the roadside and ends nine pairs of loops are served by one-ton electric luffing wall cranes for delivery of goods from the warehouses.

The Tilbury Docks

Tilbury Docks, 26 miles down the river from London Bridge, were opened in 1886. It says much for the courage and foresight of the East and West India Dock Company, who built

them that the original depth of 38-ft. has proved ample even after 50 years of immense development in shipbuilding. Some of the largest vessels coming to London are accommodated at Tilbury. Until 1917, no important structural alterations were carried out to this group of docks, but in that year the extension of the south quay of the main dock by 1,500-ft. was completed and three sheds erected; and in 1922, Tilbury Cargo Jetty, 1,000-ft. long and 50-ft. wide, was built in the river, providing deep-water accommodation with discharging facilities for part-cargo vessels not wishing to enter the docks.

Very extensive improvements at the Tilbury Docks were decided upon about 12 years ago. Briefly summarised, they comprised a new entrance lock, 1,000-ft. by 110-ft., with a further extension of the main dock, and a new dry dock 750-ft. by 110-ft., which is arranged so that it can be lengthened to 1,000-ft. without putting the dock out of commission. Tilbury was selected also for the site of the Passenger Landing Stage and Customs Baggage Examination Hall. These were brought into use in 1930, and at the same time the London, Midland and Scottish Railway Company remodelled the adjoining railway station and its approaches, thus completing a scheme to meet the need for a more convenient and expeditious approach to London for the increasing passenger traffic using the port.

So much having already been done, Tilbury Docks are not to share in the first stage of the present development scheme, other than by participation in the electrification improvements to which reference has been made.

*Site of old No. 1 Warehouse, Surrey Commercial Docks.*

Port of London Developments—continued*West Wood Wharf. Cylinders in position for false Quay.***First Stage Improvements**

The works which have been mentioned in the preceding notice as just completed or under construction at the different dock systems together with various other items, including the re-

*Widened Quay in front of No. 2 Warehouse, Surrey Commercial Docks.*

construction of bridges and quays, the provision of new sheds, etc., will complete the first stage of the improvement and development scheme, on which it is estimated will be expended somewhere between 2½ and 3 million pounds.

Later Developments

Without going into too much detail, the following are among the major works contained in the subsequent sections of the programme to be undertaken as financial and other circumstances permit.

At the north side of the Millwall Outer Dock, the arrangements are obsolete, while the dock is too narrow to permit any improvement by means of quay widening. It is proposed to reconstruct the quays on modern lines, with double-storey sheds in place of the existing single-storey buildings at the same time improving the lay-out of the road and railway facilities at a total cost of nearly half a million pounds.

Old warehouses at West India Dock erected over 130 years ago, now expensive to maintain, with weak floors, and generally unsuitable for modern conditions, will have to be replaced. This will cost about a million and a half pounds.

It is also anticipated that the quay-side transit sheds at the north quay of the Royal Albert Dock, which are less than 350-ft. in length, will eventually be replaced by longer buildings, more nearly approaching the length of the modern vessels which use them.

The East India Dock, one of the smaller docks, but nevertheless a deep-water dock, has possibilities for much development. Provision has been made in the scheme for an enlarged entrance and new warehouses and equipment.

Finally, when they are satisfied that it is necessitated by increased trade, the Port Authority are prepared to consider the building of a new dock to the north of the Royal Albert Dock. To provide and equip seven berths would cost about 2¼ million pounds.

I may add that, for the technical details given in the article in connection with the various items of work, I am indebted to the Authority's Chief Engineer, Mr. Asa Binns, M.Inst.C.E., M.I.Mech.E., under whose supervision all the above works are being carried out.

Port of London Appointment.

The Port of London Authority have appointed Mr. J. D. Ritchie, M.C., who hitherto has held the office of Solicitor and Secretary, to be Deputy General Manager.

This foreshadows the retirement of Sir David Owen from the General Management of the Authority, a position he has occupied for over 15 years. Sir David will not, however, it is stated, be relinquishing his duties for some little time yet.

Mr. Ritchie, who will commence his new duties on January 1st next, entered the service of the Port Authority as solicitor in June, 1923, and he has held the joint office of solicitor and secretary since January, 1927.

Navigable Waterways in the Netherlands

A Survey of the Traffic Problem

By L. R. WENTHOLT, D.Tech.Sc., M.Inst.C.E.

Importance of Waterways in Holland

THE Netherlands probably have more inland waterways than any other country in the world. They are found in every part of the country, but are more numerous in the low-lying north and west than in the much more elevated ground in the south-east. Some of these waterways are used by sea-going vessels, but most of them are only suitable for river craft.

This network of waterways is the result of slow growth and gradual improvement, and was of importance even centuries ago. In the seventeenth century, when most of the travelling in Europe was done by clumsy coaches, drawn along over bad,

The importance of the canals naturally declined with the coming of the railways in the second half of the last century; yet rivers and canals have always remained serious competitors to the railways, and the carriage of goods by rail has never been as important in the Netherlands as in Britain, Belgium, Saxony, and other densely-populated countries.

Access to the Large Seaports

The Netherlands have two large seaports, Amsterdam and Rotterdam, and it has always been the Government's policy to make these ports as accessible as possible.

Thus, in the case of Rotterdam a canal was dug through the island of Voorne in the years 1827-1829. This canal had



Aerial View of Ymuiden Harbour and the Entrance to the Amsterdam Ship Canal.

and often nearly impassable roads, the Dutch travelled in comfort in their "trekschuit," a barge, drawn by a horse along the canal-bank, at a speed which was then considered high, and without fear of delay, breakdowns or accidents. Goods also were mostly carried by water.

This elaborate system of waterways linked up every part of the Netherlands more closely than was the case elsewhere; and this circumstance may well account for the prominent part played by the Republic of the United Provinces in spite of its small size, not only in military, but also in political and economic affairs.

The original system of waterways consisted mainly of rivers, which, owing to the slight westward slope of the country, had a sluggish current, and an extensive drainage area. Many of these rivers were closed at their mouths by means of a weir or dam and a sluice-gate, which made it possible to regulate the flow of the water without seriously interfering with shipping, and the names of the towns which arose near these dams and sluices, still remind us of their origin. Thus Amsterdam means "a dam in the river Amstel," Rotterdam, "a dam in the river Rotte," and Maassluis, "a sluice in the river Meuse."

Besides rivers, there were also a great many lakes, most of which were drained during the seventeenth century, a process which automatically created a large number of canals to carry off the water and establish communications with near-by drainage systems. As a result, the system was somewhat haphazard, and local shipping availed itself of it as best it could. It was not until the nineteenth century that canals were dug for the express purpose of improving communications.

a lock at either end, and finished at Hellevoetsluis, at that time a well-known outpost for Rotterdam. The canal is navigable for vessels up to 235-ft. in length, 45-ft. in width, and with a draught of 17-ft. It became obsolete as ships gradually increased in size, and in 1863 a start was made with the construction of a new outlet to the sea, known as the Rotterdam Waterway. This canal, which established a connection without locks between the port and the open sea, has been constantly improved since it was first opened, and now has a fairway with a depth of nearly 35-ft. below low-water mark, and a width of 650-ft.

Until the beginning of the nineteenth century, sea-going vessels could only reach Amsterdam by way of the Zuiderzee. Even in the seventeenth and eighteenth centuries this route had given rise to difficulties, but with the constant increase in the size of ships, it now became totally inadequate.

To overcome this difficulty, the North Holland Canal was dug in 1820-1825. It reaches the sea at a spot 50 miles north of Amsterdam, and was made accessible for ships up to 210-ft in length, 46-ft. in width, and drawing 16-ft. The construction of this canal was regarded as a tremendous engineering feat in those days, and, when first completed, was the longest ship-canal in the world.

Unfortunately, as larger and larger ships were built, the canal became too small, and for this reason, and also because it was considered necessary to give Amsterdam more direct access to the sea, the North Sea Canal was constructed in the years 1865-1876. This canal passes through several locks, and reaches the North Sea at Ymuiden. Its dimensions, and those

Navigable Waterways in the Netherlands—continued

of its locks and bridges, are such that even the largest vessels can now reach Amsterdam with safety. The great new lock at Ymuiden has a length of 1,320-ft., a width of 165-ft., and a depth below low-water mark of 47-ft.

The construction of this lock cost nearly 20 million florins.

Other ports, such as Delfzijl in the north-east of the country, Harlingen in Friesland, Dordrecht near Rotterdam, and Flushing, though of secondary importance, also have quite good connections with the sea.

The Rhine and its Arms

Since the Middle Ages, the Rhine has always been one of the most important European highways for river traffic. It reaches the Netherlands at Lobith, and at a short distance from the frontier branches off into three rivers, two of which turn west, whilst the third continues its course in a northerly direction.

Even before the thirteenth century important commercial centres such as Nymegen, Tiel, Dordrecht, Zutphen and Kampen, had arisen on the banks of these three rivers. The rivers themselves had long ago ceased to satisfy the requirements of river-borne commerce, whilst the country on either side, in spite of comparatively heavy embankments, was subject to constant floods. In the nineteenth century efforts were made to put an end to this trouble, and to improve the river channels. The work was largely tentative at first, and suffered from lack of experience, so that mistakes were occasionally made; but since the year 1850, the improvement of the great rivers has been systematically carried through with most gratifying results. In the course of the last fifty years the danger from floods has practically disappeared, and each of the Rhine branches now possesses a channel of adequate depth, without troublesome variations in the strength of the current, and navigable even in the driest season.

The southernmost of these three rivers, the Waal, which forms the chief link between Rotterdam and Germany, is the most important. Even in the driest season the fairway in this river has a depth of 10-ft. and a width of 330-ft., dimensions not inferior to those of the German Rhine, which carries one and a half times the volume of water.

Amsterdam is not situated on any of the branches of the Rhine, and an artificial link with this river had therefore to be provided. For many years all traffic by water from the Rhine to Amsterdam had to pass through fairly narrow waterways, but in the years 1881-1893 a new canal was dug from Amsterdam to the river Waal near Gorinchem. This canal has a bottom width of 65-ft., and a depth of 10-ft. It is navigable for vessels with a carrying capacity up to 2,000 tons, though craft of that size have some difficulty in getting through.

A new waterway from Amsterdam to the Waal, now in course of construction, is being built on such generous lines that even the largest Rhine craft, up to 4,000 tons, will be able to use it with ease. The estimated cost of this new canal is 60 million florins.

The Mining Industry and Water Transport

In the extreme south of the country lie the Netherlands coal fields, with an approximate output of thirteen million tons per annum. Several new industries have sprung up in the neighbourhood of these mines, yet, until recently, this region was inaccessible by water. For the Meuse, which flows through it, was hardly navigable at all above the town of Venlo, whilst below that city there was only water enough in the dry season for quite small vessels.

It was therefore decided to construct a new waterway, 91 miles long, from the Waal near Nymegen to Maastricht. This waterway was completed two years ago at a cost of 85 million florins, and is by far the most important and costly work ever undertaken in the Netherlands in the interest of inland navigation. It consists of three parts:—

- (a) A canal from the Waal to the River Meuse;
- (b) the canalisation of the River Meuse from Heumen to a spot close to the Belgian frontier;
- (c) a lateral canal from that spot to Maastricht.

This waterway has been made wide enough to admit with ease river craft with a cargo capacity up to 2,000 tons. Although it was only inaugurated two years ago, the annual traffic has so far averaged at least 16 million tons, and the new connection is sure to prove a great boon to the colliery district.

The Zutphen Canal

Another recently-constructed canal is the one from Zutphen to Enschedé. This connects Twente, the seat of the Netherlands textile industry, with the existing system of Dutch waterways, and admits vessels with a cargo capacity of 1,350 tons.

An interesting point about this canal is that it embodies in its design a new principle, now very generally held in the Netherlands, that a canal, even when primarily intended for navigation, must be made serviceable for other purposes as well, even at the risk of some slight inconvenience to shipping. Hardly twenty years ago Dutch engineers were averse to using

a ship-canal for drainage purposes; to-day, it is realised that the economic value of a canal may be considerably increased, when it is made to serve other interests besides shipping.

This canal cost 20 million florins to build, but the increase in the value of the land on either side of it, owing to the improved drainage, may safely be put at 15 million florins. Moreover, due care is taken to prevent the pollution of the new canals, as an abundant supply of pure water is of great importance to local industries, especially in a district like Twente, which has a very dry soil.

Popularity of Water Travel

As we said before, the west and north of the country are covered with a dense network of waterways. So numerous are they, in fact, that people will travel even the smallest distances by boat. Before the coming of the motor car, this inexpensive mode of transport contributed materially to the country's prosperity, but its importance has declined somewhat of late years. Nevertheless, even at the present time, quite a short journey by water is often preferred to the use of a car or a lorry.

The canals, more particularly the older ones, vary considerably in width. Most of the broader ones were originally the natural waterways of the district, and these add greatly to the beauty of the landscape. Some of them, such as the Verth near Amsterdam, are well known to British tourists.

Waterways and Motor Traffic

One of the hardest questions now facing economists and engineers is whether it is still worth while to extend and improve the existing system of Netherlands waterways, in view of the rapid development of motor traffic.

On this question there is no unanimity. There are some who expect that in the future an ever-increasing volume of merchandise will be carried by the canals, and conveyed to their final destination by motor lorries. This development, if it comes about, would necessitate the construction of numerous wharves for the purpose of handling cargoes.

Others stress the importance of the railways, and argue that, as passenger traffic can never to any great extent be relegated to the canals, and railways will therefore always be necessary, it would be as well to divert the major part of the goods traffic to the railways. They also stress the point that goods can be carried by rail at all times and in all circumstances, while a severe frost is sufficient to paralyze all traffic by water.

One thing is certain, however. The advent of the motor vehicle has had a far-reaching effect on all traffic problems, and only the future can show in how far this will affect the carriage of goods by water, and consequently the economic value of the Netherlands waterways.

Karachi Port Trust

Excerpts from the Administration Report for the Year ending 31st March, 1937

The Port of Karachi, which provides 22 wharf berths, including the Bulk Oil Pier, and 18 moorings for ocean-going vessels, is administered by a Board of Trustees.

The ordinary Revenue Receipts for the year were Rs. 74,15,000, as against Rs. 70,44,000 in the previous year.

The Revenue Account expenditure on ordinary items was Rs. 71,05,000, as against Rs. 67,74,000 in the previous year.

The financial result was a surplus of Rs. 3,10,000 on the year's working.

A sum of Rs. 79,105 was withdrawn from the Reserve Fund during the year, for Capital works, and a sum of Rs. 9,389/- was credited to it on account of profit on interfund transfer of scrip in addition to the sum of Rs. 2 lakhs mentioned in the last year's report. At the end of the year the Reserve Fund stood at Rs. 52,29,013.

The total volume of imports and exports was 2,086,000 tons, or an increase of 12.5 per cent. over the previous year's figure of 1,855,000 tons.

Imports were 815,000 tons, or a decrease of 2.9 per cent. over the previous year's figure of 839,000 tons; exports were 1,272,000 tons, or an increase of 25.2 per cent. over the previous year's figure of 1,015,000 tons.

The percentages of increase and decrease in revenue, in tonnage of cargo and in tonnage of shipping over the previous year compare as under:—Revenue, 5.26 per cent. increase; cargo, 12.5 per cent. increase; shipping, 2.7 per cent. increase.

The number of foreign-going vessels entering the port and using the ship wharves was 969, the same as in the previous year, and the net register tonnage also was practically the same, being 2,533,396 tons.

The total expenditure on dredging operations during the year amounted to Rs. 3,79,684, against Rs. 3,57,726 during the previous year.

The Report is signed by Col. D. S. Johnston, the Chairman.

Bank Revetment of Entrance Channel to the Port of Dieppe

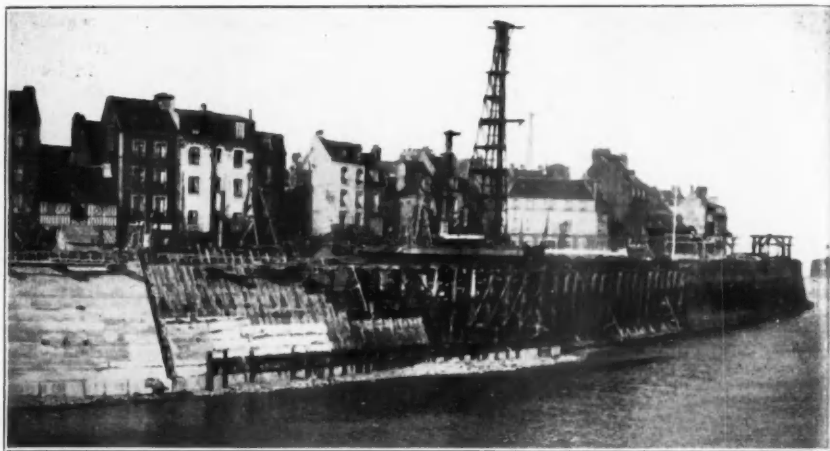
By M. PÉTRY, *Ingenieur des Ponts et Chaussées.*

(Translated from the French)

I.—SITE AND FORMER WORKS

THE Port of Dieppe is formed in a natural haven, constituted by the estuary of the River Arques. The sea, by drifting the shingle along the coast, had closed the mouth of the valley by a sort of bar or spit, called a "poulier"; the river came down in a winding course between two low hills, then spread out in a broad lagoon and finally broke through, by an unstable opening, to the sea. A channel was defined and maintained by artificial means alongside the eastern hill. On the western side the houses of the sea-faring population stretched from the castle on the hill, over the whole spit, to the channel. But the protection of the point was not easy to effect; the river being bounded on its right bank by solid chalk, tended to erode its left bank of loose shingle; the action of the currents was intensified by tidal ebb and flow; storms sometimes increased the erosion, sometimes blocked the river outlet; while seamen required that the depth of the approach should be maintained and even increased.

It was in these circumstances that, in order to stabilise the left or western bank and to safeguard the neighbouring buildings, the maritime engineers concerned constructed a succession of works, some in timber, others in masonry, in the form either of groynes across the current or of embankments parallel with it. It was not until early in the 20th century that the problem of defence was completely solved by the construction of two converging jetties, extending outwards to the bottom contour of 4 metres below low water, a depth at which the waves have no disturbing effect on the shingle.



General View of Temporary Gantry. A tee beam being placed.

The work about to be described retains the bank between the channel and the houses at the "pierhead." The difficulties of construction lay in the height of the slope, the narrowness of the strip within which the work must be confined and, lastly, the presence in the bank of the foundations of earlier works. Between 1840 and 1850, a timber revetment had been constructed at this point, consisting of framed bents at intervals of 2m.60 (8-ft. 6-in.), with intermediate sheet piling and walings.

In 1885, decay having attacked the piles and some other timbers, these had to be replaced, the new pieces being of creosoted and tarred fir. The channel having to be deepened, from zero to a depth of 2½ metres, a curtain of piles and sheeting in beech timber was driven at the toe of the revetment and sunk, with considerable difficulty, to the depth of 4½ metres below zero. The gap between this curtain and the front row of piles was filled with concrete in 1907. In the following year, the bottom of the channel was dredged to -4m.

In 1875 and in 1911, railway sidings in connection with the maritime station were laid on the narrow strip of land retained by this revetment. In 1927, the work threatened to collapse. To save the expense of a substantial gravity wall, a project was advanced to substitute a reinforced concrete false quay, below which the slope of shingle would be pitched with concrete blocks. One might question the stability of such a form of construction, alongside a channel into which the swell of the sea entered. But the experiment did not go very far. The first of the reinforced concrete piles to be driven had their points deflected as they went down, by large flints, fragments of foundations and very old piles, while their shafts were rigidly embedded in the shingle. Thus they had to bend in order to penetrate and broke under the blows of the driving hammer. It was best to abandon the idea of founding upon piles.

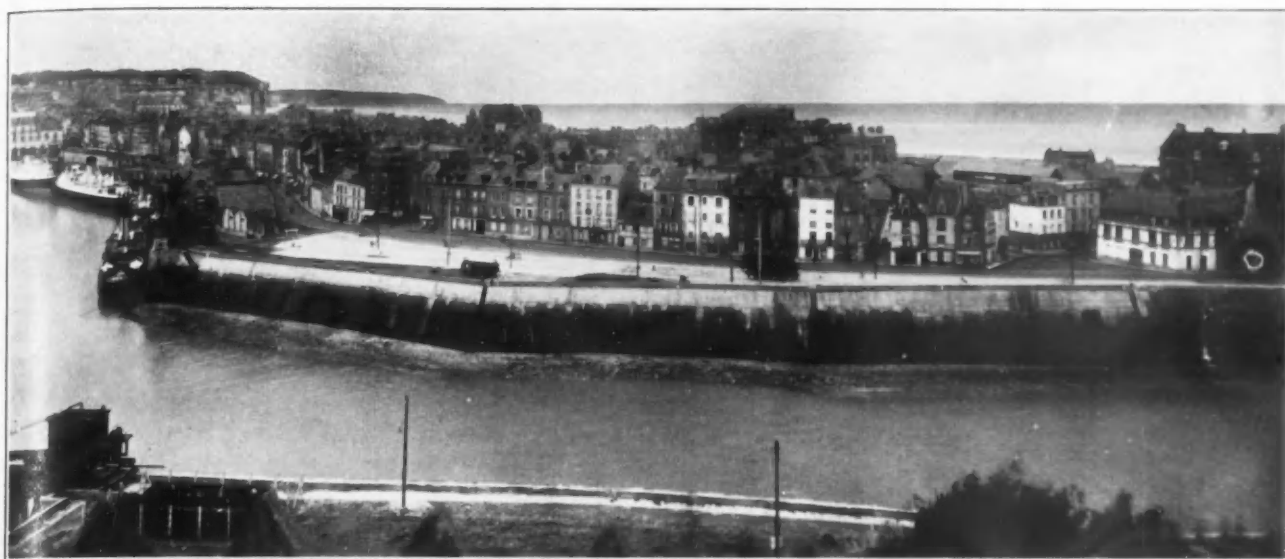


Inside the Shuttering for the Concrete Revetment Wall.



Retaining Curtain of Sheet Piles.

Port of Dieppe—continued



View of the Completed Work.

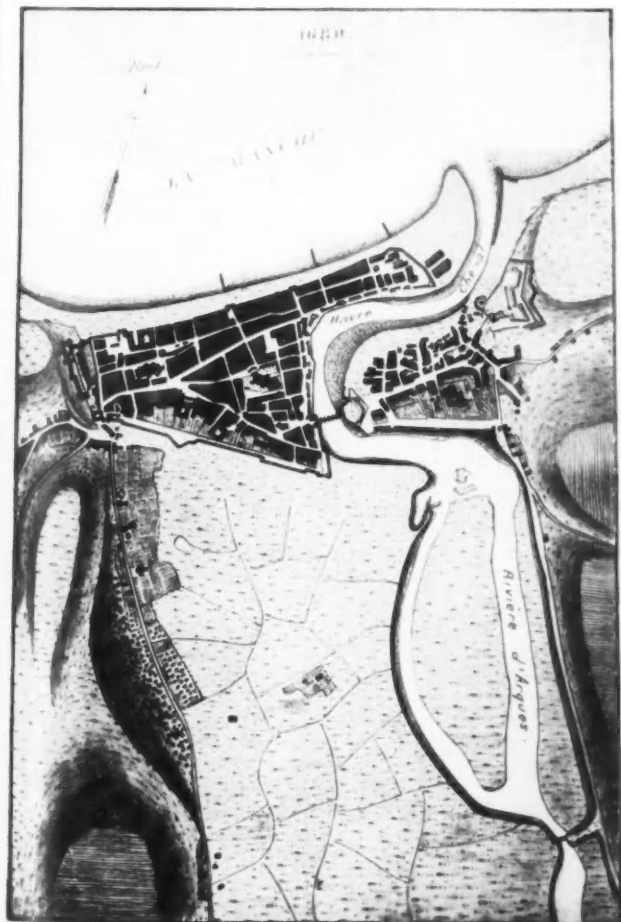
II.—NEW REVETMENT

The objective was to retain as wide a strip of ground as possible, on the margin of a channel subject to strong tides and sea-swell, but where ships would not be moored. The bank had therefore to be protected against erosion, as in any estuary, under the special condition that it should be as steep as possible, yet with no need for a vertical face.

The problem being thus viewed, the solution was evident: a retaining curtain of steel sheet-piling, from low water level down to below the bottom of the channel, surmounted by a revetment at a steep batter in reinforced concrete, with tie rods and anchorage blocks set well back to resist the forward earth pressure. In this way the steel sheeting, being almost always submerged, is practically immune from corrosion: the revetment can be constructed by tide work, and the anchorage is not so deep as to encounter any trouble due to the remains of former works.

There remained, however, one serious difficulty in execution, at the junction of the top of the sheeting with the toe of the revetment, where there is a concentration of intersecting forces. The lower tie-beams give point reactions: a stiff horizontal waling is required at this level to take up the distributed pressure. But as this level is only exposed for a short time, even at low water of spring tides, there is little facility for the work.

The Western Public Works Contractors ("Entreprise des Travaux Publics de l'Ouest") were awarded the contract, on account of the skilful scheme of construction proposed by them. The sheet-pile curtain was to be cut to form a toothed outline, the lower tie-beams and the members forming the lower waling were to comprise interlocking sockets and to be pre-cast on land, then lowered in the toothings of the sheeting, and framed into them like pieces of joinery mortised and tenoned: then upon this foundation of great rigidity the revetment would be moulded, working between tides.



Comparative Plans: Dieppe in 1680 and 1936.

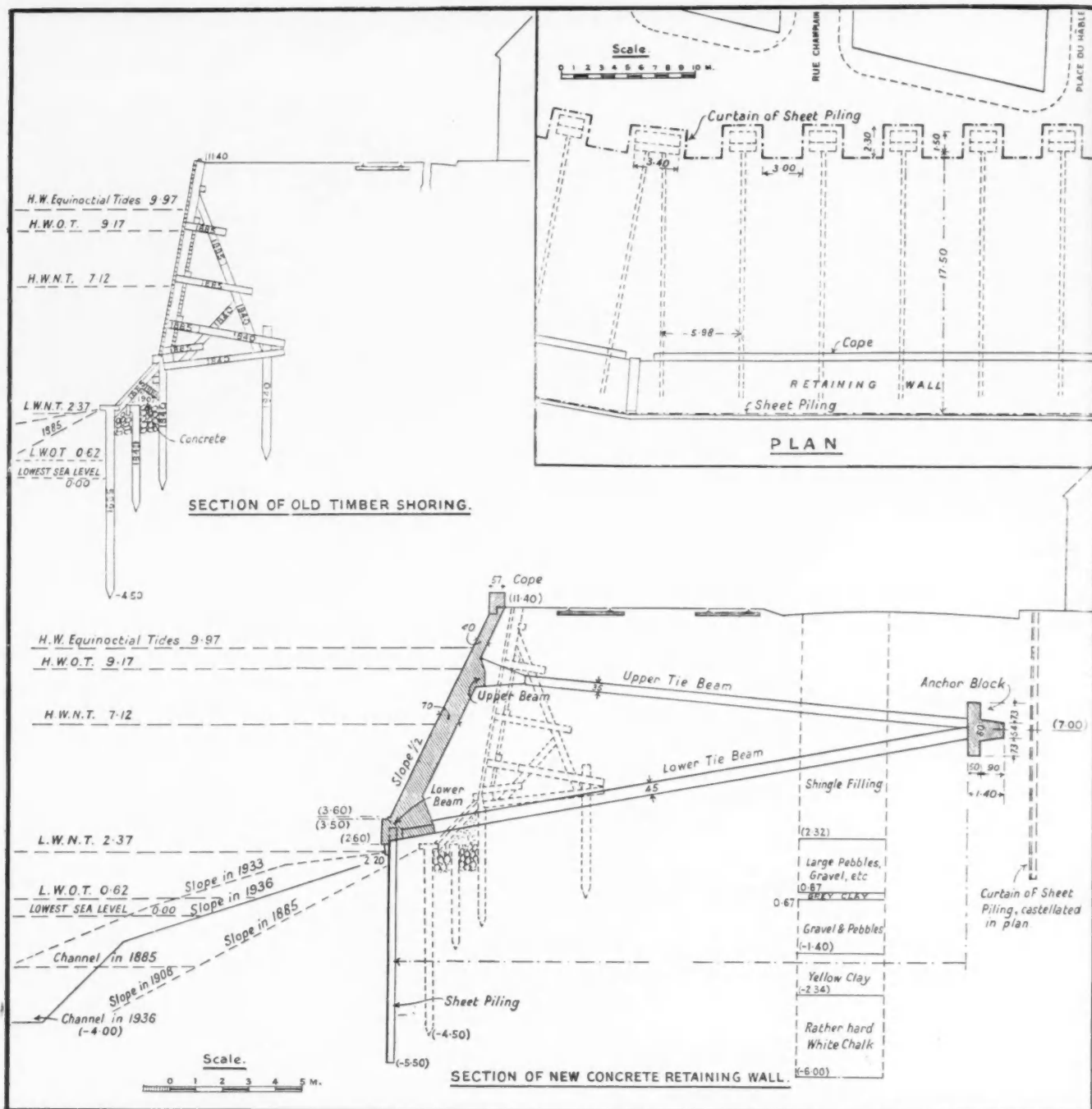
La Manche—English Channel
Brise Lames—Wave Trap

Havre—Harbour
Avant Port—Outer Basin

Chenal—Channel
Arriere Port—Inner Basin

Riviere d'Argues—River Argue

Port of Dieppe—continued



The figures give details of the constituent parts of the work: the general arrangement will be better seen in the course of description.

III.—CONSTRUCTION

The first requirement was that the concrete should be of a composition giving great strength and especially great density. The proportions adopted were 800 litres of sea shingle, 300 litres of sea sand, 100 litres of crushed pit sand, and 375 kilograms of Portland cement of marine quality. It was vibrated in the forms throughout.

The contractors' scheme of execution called for great care in depositing; so they put in construction plant to serve the whole site. A travelling gantry on double track was carried, on the channel side, on two rows of piles embedded at the toe of the old work, either in the shingle or in concrete, and firmly braced: on the other side, on two rows of piles driven in. This gantry carried the frame for driving the sheet piles of the retaining curtain, the excavating grab cranes and various winches for handling and placing the pre-cast members.

The curtain of sheeting was put in with great care: a course of temporary guides fixed to the ground marked the alignment: the piles were assembled in groups of twenty, then driven, for a depth of 2 metres at a time, with the frame travelling alternately backward and forward, to guard against any lateral movement as they went down; finally, they were left with their tops either at +3.25 or +2.75, according to plan, to give the required toothed outline.

At high tide the piling gang worked along the landward side of the site, in front of the houses, driving the sheeting of the

"undulated" or recessed protective curtain, while the concreting gang prepared, on solid ground, the tie beams and the pre-cast members of the lower waling.

When the retaining curtain was completed, the travelling gantry was brought back to the starting point, and the whole equipment began to work forward again on construction. The shingle, excavated ahead by two grab cranes, was immediately run back by band conveyor and refilled behind the work. Just behind the retaining curtain, a level floor was formed by depositing a layer of concrete. On this were laid the ends of the lower tie-beams and the pre-cast walings, at the level of +2.75, in the indentations of the toothed sheeting.

The enlarged socket end of the tie beam enclosed the top of a sheet pile standing up to +3.25. Several intermediate piles were covered by a segment of waling, which also bore at either extremity against the tie beam ends.

The upper tie beams were set in place and held by temporary stays, then their inner ends were embedded in the anchorage blocks. It is noteworthy that the excavation reached a depth of 6 metres even in the vicinity of the houses, but by a special measure in the layout of the protective sheeting this was driven to form "undulations" or recesses, and each of the anchorage blocks was located in one of these recesses that four stays were able to support.

In the lower walings were set stirrups to connect with the upper work. The interlocking sockets and joints were run with mortar. A course of bars was laid horizontally above the waling segments to give continuity, and the skeleton reinforcement of the face wall was carried up within form-work made

Port of Dieppe—continued

in removable panels, which were rigidly connected by bolts passing through concrete tubes acting as distance pieces.

The concrete was poured in one-metre lifts, and after stripping the shutters and removing the bolts the holes in the tubes were stopped with mortar. The concrete is left as stripped and

only opened $\frac{1}{2}$ to 1 millimetre, but are enough to show that it would have been better to provide expansion joints at intervals of 25 or 30 metres.

After refilling the excavation, the next thing was to draw the sheet piles of the protective curtain in the rear, which are to



The Socket End of a Tee Beam set in place.



Protective Sheetting, in recessed outline.

has a very fair face. The coping is of red brick, giving a line of live colour. Figures, built up of white enamelled bricks, show the reference numbers of sounding lines for the dredging surveys. A few cracks have appeared in the wall, being attributed to the shrinkage of concrete in setting and exposure to the heat of the morning sun when the tide is low. They have

find their final use when driven as a protection to the toe of the wall on the opposite side of the channel. On the finished ground surface, the railway sidings have been relaid to an improved layout.

The general appearance of the completed wall may be seen in the illustration in this article.

Canadian National Harbours Board

Review of Work Accomplished

At the Annual Convention of the American Association of Port Authorities at Wilmington, Del., in October, Mr. Ralph O. Campney, Chairman of the National Harbours Board of Canada, gave an interesting account of the work of the Board, comprising himself and two colleagues, Col. A. E. Dubuc and Mr. Bennett J. Roberts, during the period since their appointment.

The following is a report of part of the address reprinted from "The Shipping Register and World Ports," the official organ of the American Association of Port Authorities.

"Throughout our tenure of office," said Mr. Campney, "the members of the Board have endeavoured to study our problems carefully before taking action. We have sought to apply our best judgment to the matters in hand, and have endeavoured at all times to avoid arbitrary or bureaucratic action.

"We have endeavoured to deal with business problems in a business way. We have sought to study and recognise the particular problems of the ports under our jurisdiction so that we might approach those problems from the point of view of the port concerned. To that end we have spent a good deal of time at the ports, and have welcomed every opportunity of meeting those interested, directly or indirectly, in their operation.

"We are anxious at all times to continue proper development and expansion of the ports under our jurisdiction, and to provide new facilities as soon as they may be reasonably justified. In that connection we must, of course, bear in mind that the revenue from such facilities ought to be sufficient to cover not only operation and maintenance expenses, but reasonable interest charges, and, eventually, retirement of capital cost as well. I observe this because I believe that, as port administrators and operators, we should all work steadily toward making the ports under our respective jurisdictions self-supporting.

"We are desirous of improving and speeding up, as rapidly as may be possible, our port services. In short, we are doing our best to improve efficiency and despatch at the ports under our jurisdiction, realising clearly the great importance of those ports as links between the railway systems and inland waterways of Canada and the great ocean trade routes of the world. Our task is arduous but intensely interesting. We hope that by our work we are making some contribution towards the welfare of Canada, and that in the process of doing so we may eventually also contribute something to the science of port management and administration.

Comparison of Results

"The result of the work done in 1936 is clearly reflected in dollars and cents when one makes a comparison with 1935. In

1935, operating revenues for the ports under the Board's jurisdiction totalled \$7,427,454.00.

"In 1936, the operating revenues amounted to \$8,030,600.00, an increase of \$603,146.00 or 8.1 per cent. In 1935, the operation and maintenance expense aggregated \$4,975,713.00, a decrease of \$481,042.00 or 9.7 per cent. After taking into account miscellaneous income, the net income available for interest and depreciation was \$3,601,346.00, as compared with \$2,473,261.00 in 1935, an increase of \$1,128,085.00 or 45.6 per cent. On capital account for the provision of new facilities and replacements, approximately four and a half million dollars was expended by the Board.

"The above facts indicate, I respectfully submit, a fair showing for the first year of operation by the Board.

"During the present year the work of reorganisation has continued, and at the present time the Board is engaged on a careful study of its rate structure with a view to making necessary revisions.

"The result thus far in 1937, bearing in mind the partial failure of the Canadian grain crop, which, of course, affects the Board's revenues very materially, has been very encouraging.

"The total assets administered by the Board represent to-day a capital investment of approximately two hundred and fifty million dollars. These assets comprise wharves and piers providing a minimum of 212 berths, 84 transit sheds with a floor area of 4,776,000 square feet, 13 grain elevators having a total capacity of 52,512,000 bushels, 3 cold storage plants with a combined storage capacity of 6,128,000 cubic feet, 3 terminal railway systems, 2 toll bridges, one at Vancouver, the other at Montreal, representing together an investment of over twenty millions of dollars, marginal roadways, floating equipment, log booming grounds and numerous other facilities. In addition to the above, the Board has large areas of land under lease as industrial sites.

"The permanent employees of the Board number approximately 1,600, in addition to which the Board employs casual employees running into many hundreds, the number varying, of course, from time to time.

"The operating revenues of the Board for the calendar year 1936 were in excess of eight million dollars. The operating and maintenance expenditures for the same year were approximately four and a half million dollars.

"In 1936, 73,000 vessels arrived and departed from the ports under the Board's jurisdiction. Twenty-eight million tons of cargo were handled during the same period."

Free Port at Galatz.

A report from Bucharest states that the Roumanian Government is considering the establishment at Galatz of a free port, which will include warehouses and factories. It is understood that steps have been taken by overseas concerns to secure sites in the proposed free zone.

Notes of the Month

New Grain Silos at Trieste.

New grain silos, with a capacity of about 30,000 tons, have been erected at the Port of Trieste. The berthage of the quay alongside the silos will accommodate simultaneously two vessels of 9,000 tons.

Dutch Dredger at East Indies.

The Dutch dredger "Doejoeng," which is claimed to be the largest dredger in the world, has reached Billiton, an island in the Dutch East Indies. The "Doejoeng" was towed from Rotterdam by tug, and the trip took 113 days.

Port of Trondheim, Norway.

As a consequence of increasing trade, and to meet the growing demand for improved accommodation, the Harbour Authorities at Trondheim are working on an extensive development scheme.

New Port on the Vistula.

A new harbour to serve central Poland has been constructed on the River Vistula, between Danzig and Warsaw. Goods which hitherto have been dispatched by rail from coastal ports will now be forwarded by river craft at reduced cost. It is estimated that the new harbour will cost approximately 3,700,000 Zlotz, and will be able to handle 200,000 tons of goods per annum.

New Chairman Bristol Docks Committee.

In consequence of the advent to power of the Labour Party on the Bristol City Council, the former chairman of the Docks Committee, Alderman E. M. Dyer, has been displaced by the election of Alderman A. W. S. Burgess, a member of the Committee for 16 years. Alderman Dyer has occupied the chair since 1924, and tributes were paid to him by various members of the Committee.

Further Extension at Port Haugesund.

Although considerable improvements have been effected within the last two years at the Port of Haugesund, increasing trade necessitates a further extension of the accommodation. The Norwegian Municipal Bank has agreed to advance a loan of £400,000 for the work, and the Harbour Board has drawn up a scheme to lengthen the quay by about 180 metres. When completed, the new quay, which will be constructed in concrete, will be 384 metres in length.

Canalisation of the River Werra.

According to reports in the German press, a start has been made with the canalisation of the River Werra, covering a distance of approximately 100 kilometres from Munden to Wartha. A first office of works was erected early in November at Munden, as well as an office at Eisenach for preparing the draft of a project for an extension of the canal by about 50 kilometres from Wartha to Merkersey. The canalisation of the River Werra constitutes an extension of shipping on the River Weser towards the south, and is intended to supply the industries of Thuringia, and chiefly the exports of the potash industry along the Werra with an urgently necessary connection with the general German canal system.

Increased Goods Traffic at Italian Ports.

During the first nine months of 1937 there was a considerable expansion in goods traffic at Italian ports. In connection with the progress at Genoa, it is interesting to observe that the representatives of the various Ministries interested in the project of creating a free port there, have agreed that the boundaries of the free port should be represented on the west by the mouth of the River Polcevera, on the east by the San Giorgio Pier, and northward by the railway line. Until the necessary works are completed, it has been agreed that the free port shall be brought into operation immediately on the Ethiopia and the Libia Piers of the XXVIII Docks, in order to encourage the development of Mediterranean shipping through Genoa.

Extension of Channel in Hudson River.

Work to deepen the Hudson River channel to 40-ft. from Ellis Island to West Fifty-ninth Street, and from the pierhead on the New Jersey shore to the pierhead on the Manhattan shore, was started early in October. It is estimated the work will take nearly a year, and the 100-ft. extensions on Pier 59 and Pier 60, Hudson River (two of the Chelsea terminals of the International Mercantile Marine) will be removed, as it is considered that they are a danger to navigation. The extensions were built on the two piers about 20 years ago, to accommodate large liners. Modern liners, however, now use berths of greater length at West Forty-sixth Street and at the city's new 1,100-ft. terminals between West Forty-eighth Street and West Fifty-second Street.

Proposed Harbour at Kemi.

In order to induce winter traffic to visit North Finland, proposals are under consideration to build a deep harbour at Kemi.

New Beacon on the Clyde.

A talking beacon has been established at Cloch Lighthouse, near Dunoon Pier, at the entrance of the Clyde, on account of the dangerous nature of the Gantocos Rock on the opposite side of the Firth.

Galway Harbour Development Scheme

Following the announcement in our July issue of the development scheme at Galway Harbour, we understand that work has now commenced. A wage agreement to cover the period of the work has been drafted and ratified by the contractors and the Irish Transport and General Workers' Union.

Pattullo Bridge Opened.

The Pattullo Bridge, which spans the Fraser River at New Westminster, British Columbia, was officially opened in November. The bridge carries four lines of traffic and a footway, and its central spans have a clearance of 150-ft. above normal flood level. It cost 4 million dollars to build, the work taking several years.

Shipping Service to Shanghai.

An early resumption of the steamship service to Shanghai is expected as the result of reports that a 75 per cent. reduction in war risk insurance rates in London will be followed in New York. The acceptance of cargoes may first be on an optional bill of lading permitting discharge at any other port should a call at Shanghai become inadvisable.

New Fish Harbour for Gaspé, Quebec.

Work of constructing the new fishing harbour at l'Anse au Brillant, a few miles east of Gaspé, Quebec, at an estimated cost of \$40,000, is now in hand, and operations will continue well into the winter. A new wharf is to be constructed at Little Gaspé at a cost of \$6,500.

Improvements at Tralee Port.

The Tralee and Fenit Harbour Commissioners announce that the legal preliminaries for improved facilities at Tralee are nearly completed, and work is expected to commence next year. The Irish Free State Government has made a grant of £20,000 towards the cost, which it is estimated will total £48,000.

Maryport Harbour Extensions.

With the object of encouraging coal exports through Maryport, and also of introducing new industries which would make use of the harbour, the District Commissioner for the Special Area of West Cumberland, has announced that it is proposed to spend a large sum of money on the harbour. Negotiations are now in progress to purchase land near the port, on which to erect a number of new factories.

Tyne Improvement Commission.

At the annual meeting of the Tyne Improvement Commission, held in the middle of last month, Sir Arthur M. Sutherland, Bt., was re-elected Chairman, and Sir Frank Simpson, Vice-Chairman. Mr. A. Blacklock, secretary of the Commission, was, on the recommendation of the Administrative Committee, appointed Joint Secretary and General Manager.

Dry Dock Accommodation at Cape Town.

Since the programme of harbour extensions at Cape Town has been made public, there have been many protests from shipping and other commercial interests at the long time that will elapse before adequate dry-docking facilities are available. According to present plans, the provision of a new graving dock is not contemplated until the second part of the extension programme is started, which will not be before 1942, at the earliest. In view of this, endeavours are now being made to obtain sanction to construct a new graving dock on the Woodstock side of the Bay.

More Lifeboats for the British Isles.

The Royal National Lifeboat Institution, in its provisional building programme for 1938, has decided to construct 19 new motor lifeboats at a cost of between £3,000 and £9,000 each. During the present year 11 vessels have already been completed, and 17 more are under construction and will be ready for service by July, 1938. Many of these new vessels will replace older motor lifeboats, but others will replace pulling and sailing boats, of which there are now only 29 on the coasts of Great Britain and Ireland, and within the next three years the Institution hopes to replace these with modern craft.

New Port for Lighters at Tel Aviv, Palestine

THE story of Palestine's ports dates back to early history. The Ports of Askalon and Gaza recall the valour of the Philistines, who inhabited the coastal plain. Jaffa, called Joppa in ancient times, was an important commercial port to which Hiram floated his timber from Lebanon in response to Solomon's request, and it was also a passenger port, since it was from Joppa that Jonah set sail for the western Mediterranean. Later, in the Roman period, the harbour of Caesarea was constructed as the Imperial naval base in the Middle sea, and in modern times, when Palestine was under Ottoman rule, in addition to Jaffa and Haifa, the lesser Ports of Athlit and Tantura, Acre, Gaza and Caesarea were used for the export of grain and melons.

The construction of the Port of Haifa a few years ago gave Palestine once again one of the most important harbours in this part of the Mediterranean, but at the same time the importance of this work tended to divert attention from the smaller ports. In March, 1937, work was completed on improvements at the Port of Jaffa, and since May, 1936, work has been in progress on the new Lighter Port of Tel Aviv.



Construction of Permanent Sea Wall.

siderable expenditure on constant dredging operations. Again, as recently as 1934, the Palestine Government had considered the feasibility of unloading timber consignments at Tel Aviv, but the enquiry was allowed to lapse.

Finally, in the spring of 1936, when the strike of the Jaffa lightermen completely paralysed work at that port (where only Arabs are employed) and the abnormal political conditions gave no promise of security for Jewish life or goods, it was decided, in the first place, to construct a jetty at Tel Aviv, and later the plans were extended to include a lighter port.

Work on harbour facilities for Tel Aviv began in May, 1936. It was decided to commence work on the stretch of beach adjoining the Levant Fair Grounds, near the mouth of the Yarkon River, the beach at this point giving the necessary depth of water, above the rock-line, to allow lighters to be loaded just off the shore. The Fair Grounds provided ready-made concrete roads, and the adjoining buildings can, if the necessity arises, be converted into temporary warehouses, although the accommodation would be limited and the working arrangements rendered difficult by the congestion of traffic and merchandise.

The necessary funds for the undertaking were raised through the "Marine Trust," which offered its shares for public subscription, the sum of L.P. 75,000 being subscribed in a few days. Later, a second issue was floated and a further L.P. 100,000 obtained.

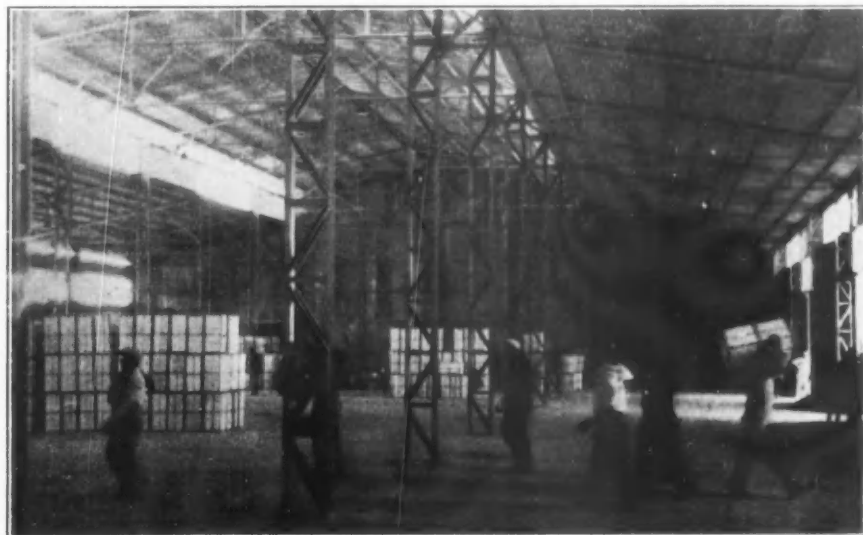


View looking Westwards through entrance. Dredging of Channel in progress.

Tel Aviv is situated a short distance north of Jaffa on the Mediterranean coast, and has, at present, a population of over 150,000, and this number continues to increase rapidly, owing to the influx of Jews from other countries. The town stretches northward for some 6 kilometres (3½ miles) to the Yarkon River, and runs inland to a distance of about 2 kilometres (1¼ miles). The Jewish inhabitants in Tel Aviv and the surrounding villages number over a quarter of a million, representing 57 per cent. of the entire Jewish population and 20 per cent. of the total population of Palestine.

Previous Plans for a Port

The reasons for constructing a port at Tel Aviv are largely political, and as such do not come within the purview of this article. As early as 1920, plans had been drawn up for the construction of a port on the site of what is now the Casino, at the end of Allenby Street. Five years later, the subject was again revived at the time when the question of railway deviations was under discussion. In 1929 a definite scheme was elaborated for the building of a small harbour at the mouth of the Yarkon River, but this was found to be impracticable, since in winter the river discharges enormous quantities of water with a high silt percentage, and, were a harbour to be constructed at that point, it would virtually become a silt-trap in the winter, not only endangering both the harbour accommodation and shipping by the velocity of the current, but also entailing very con-



Interior of Transit Shed during 1936/37 Orange Season.

Tel Aviv, Palestine



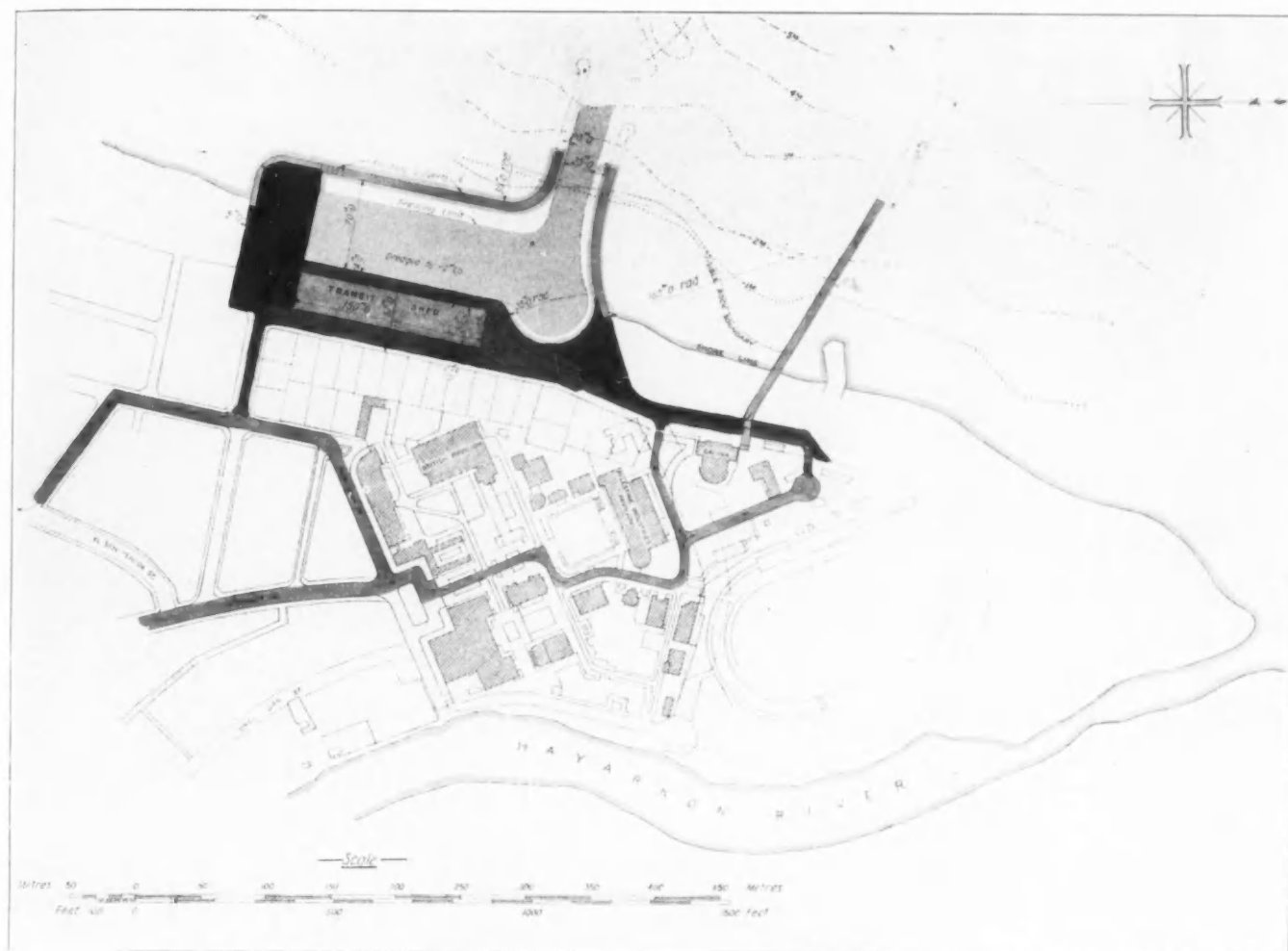
General View.



View of Lighter Basin from North.



View of Lighter Basin from South.

New Port for Lighters at Tel Aviv, Palestine—continued*Tel Aviv Harbour Project. Provisional Arrangement.***Description of the Works**

A beginning was made with the jetty and a wooden customs shed was also erected at the same time. The jetty has a length of 220 metres (715-ft.) and is 6½ metres (20-ft.) wide, and is an open structure constructed on rails, steel-framed and decked.

Side by side with the construction of the jetty, the urgent work of unloading went on; in the first place, the stevedores waded into the sea, and then, as the jetty grew longer, lighters and cranes were employed.

Work on the Lighter Port was started early in October, 1936. Connection with the sea was made by means of a channel 25 metres (81½-ft.) wide running east to west, with a depth of 2½ metres (8-ft.), protected on both sides by breakwaters 37 metres (120½-ft.) apart, allowing for a further widening of the channel at a later date. The protecting breakwaters may eventually be continued further seaward. The sea walls are of the gravity type, and are carried to a height of 2½ metres (8-ft.) above mean sea level. The entrance channel has been constructed in a straight line, so that lighters may ride in on the waves. In order to absorb the incoming rush of water, a wave-trap has been designed opposite the channel opening; this is semi-circular in shape with a graded embankment to take off the shock of the waves, and so protect the basin lying south of the channel.

The basin has a clear working length of 152 metres (495-ft.) and a width of 70 metres (227½-ft.) between the quay and the west sea wall. The western sea wall will eventually be of a similar construction to that of the breakwater, but the final 100 metres are temporarily built of wire netting filled with stones, making a rubble wall 6 metres wide. This will later be replaced by the continuation of the breakwater. The lighter quays form the southern and eastern boundaries of the dredged basin, the main quay being 152 metres (495-ft.) in length.

A transit shed, 70 metres long by 30 metres wide, has already been completed, another is in course of construction, and a third is projected.

The entire area of the lighter port is served by a wide road running through, and connecting with, the roads in the Fair Grounds, thus giving good connection with the town. Owing

*South Breakwater. Driving Steel Sheet Piling for Cofferdam to construct underwater foundations.*

New Port for Lighters at Tel Aviv, Palestine—continued

to the congestion experienced in the early stages of the building operations, a system of one-way traffic has been installed in order to speed up and facilitate transport.

Future Developments

The port is not yet completed, and much remains to be done. It is realised the entrance channel may have to be further protected in order to lessen or reduce the silting. The protective constructions will be carried southwards, providing an additional wharfage of 70 metres (228-ft.) south of the basin. The entire area of the port has to be paved, and the connection between the jetty and the shore must be improved so that the transit sheds may serve the jetty as well. The jetty is to be

improved and lengthened a further 100 metres (325-ft.), also additional maintenance machinery, dredgers, cranes and other operating machinery have to be installed.

Until recently, there have been a number of restrictions regarding the unloading of certain classes of goods at the port, but on Friday, 24th September, it was officially announced by General Sir Arthur Wauchaupe, the British High Commissioner, that the Palestine Government had decided to permit the unloading of all classes of merchandise. It is hoped that in the near future permission will be forthcoming to allow the embarkation and debarkation of passengers as soon as the necessary quarantine, passport, and immigration offices are built and opened.

Eighth Interstate Conference of Australian Harbour Authorities

*Excerpts from Opening Address by the Hon. E. S. SPOONER
M.L.A., Minister for Works and Local Government*

It is perhaps hardly necessary for me to remind you, gentlemen, all of whom are engaged in maritime administration, of the importance of your work in relation to Australian development and Australian trade and shipping, but these Conferences are convenient times for all of us to take stock of our position in relation to Commonwealth and overseas trade, and a convenient time for us to pause and consider where our policies will lead us if they are well-founded. The geographical situation of the Commonwealth and her distance by sea from the countries that buy her exportable surplus, and from which she purchases her requirements, makes the shipping industry a matter of paramount importance to the producer and to the importer, and it follows that the control of ports and navigation is of vital interest to the whole public, which is very much concerned with the facilities for shipping and their effects upon fares and freights, as well as upon the degree of expedition and safety that accompany the handling of passengers and cargo. It has very often been urged that the control of Australian shipping should be vested in one central Federal authority. It may be years before that objective is reached, and for the present the division of functions between Federal and State authorities appears to have proceeded as far as is necessary for the efficient control of the ports, and the shipping that uses the ports. It is essential, however, that there should be complete co-ordination between the Federal and State authorities, as well as between the various State authorities, and here is the great value of conferences such as this, which invite an understanding of the problems of the many Australian authorities that control shipping.

The uses of Australian shipping, as you well know, may be broadly divided between overseas, interstate, and intrastate problems. Despite the apparently domestic aspect of many of these problems, there is great necessity and much advantage to be derived from uniformity of procedure and for the control of shipping of whatever nature that uses the ports. While overseas and interstate shipping is a Commonwealth function, and while intrastate shipping remains a State function, there is much in common, for the same ports, wharves and general facilities are used by all. The growth of the Commonwealth and the expansion of trade each year brings with it a greater need than ever for standardisation, as far as is possible, of the regulations that govern ports and shipping. This result can be achieved without disturbing the local autonomy that frequently proves very convenient to users of the ports, and it is very handy for the users of the ports to have immediate access to those who finally administer the laws and regulations which govern the ports.

Unlike many of her competitors in the production of raw materials, such as Argentina, Denmark, America, Canada and South Africa, Australia is situated a vast distance from the principal markets of the world, with the result that she is under a considerable disadvantage in the cost of transport. If Australia is to overcome that disadvantage, it is essential that the costs be kept as low as possible by the provision of adequate and proficient port facilities. The handling of shipping in ports is equally as vital as the actual shipping itself.

The importance of shipping in the economic life of Australia may be seen from the fact that Australia has an extensive coast line with the most fertile areas located along the sea border. As transport by sea is undoubtedly the cheapest form of transport for long distance, it is apparent that the Australian trade is peculiarly adaptable to this form of transport.

The extent of Australia's dependence upon shipping may be illustrated by a few figures. In 1934-35 the total production of the Commonwealth, expressed in Australian money, was 356 millions. Of this, the value of exports was 113 millions. In

the same year the value of imports to the Commonwealth was 93 millions. So that shipping handled in that year merchandise to the value of 206 millions, expressed in Australian money. That, of course, does not include the interstate and intrastate shipping, which is additional to those figures.

I have not available at the moment the aggregate shipping totals for all ports of the Commonwealth. During the year 1935-36, however, the tonnage (net) of the 6,985 ships which used the Port of Sydney, inclusive of interstate and coastal trade, was 10,479,774. These figures show the extent to which the shipping using the Port of Sydney has increased during this century, particularly when it is realised that in the year 1901 the total number of vessels which entered the Port of Sydney was 1,884, with a tonnage of 2,953,511.

I have referred only to the Port of Sydney in making that comparison, but the coast line of New South Wales covers a distance of over 600 nautical miles. Other than the capital city port of Sydney, the principal shipping ports are Newcastle and Port Kembla. In addition, there are about thirty improved river entrances, natural estuaries, and open roadsteads where trade communication by sea is maintained.

The capital outlay upon the development of ports and river entrances in New South Wales up to the present is £19,658,386, and that has been allocated as follows:—

	£
At the Port of Sydney	12,604,217
Newcastle	2,437,174
Port Kembla	1,134,501
At other Ports	3,482,494
Giving the total of	£19,658,386

Training walls and breakwaters have been constructed up to a certain stage at the various river entrances, and the entrances have been maintained for shipping by periodical bar dredging. Harbour development works are in progress at Coff's Harbour, Port Macquarie and Port Kembla. It is proposed to reconstruct at Port Kembla one of the principal shipping jetties so as to give more extensive accommodation for overseas shipping. Port Kembla gives promise of great development in the near future, because of extended industrial activities, which include the iron and steel works, electrolytic copper, copper products, firebricks, as well as an extensive coke and coal shipment from the port.

It is interesting by way of comparison to note that the tonnage that entered the Port of Sydney during the year ended 30th June, 1936, was a record, and this included an increase of 16 per cent, in interstate shipping trade. The gross income of the port in that year exceeded £1,000,000. The Maritime Services Board was able to meet all the port expenses, as well as interest, exchange, and sinking fund commitments on the port capitalisation, and still show a surplus.

The Government of the State has from time to time considered the necessity for revising the capitalisation of the Port of Sydney, which, in addition to its local trade, handles a large proportion of the overseas imports and exports for the whole State. It is the only port in New South Wales that up to the present shows a surplus after providing for capital commitments. These proposals will receive closer consideration at an early date in conjunction with new legislation, to which I will refer in a moment.

Until recently there has never been a physical stocktaking and valuation of the assets represented by capital expenditure at the ports, but this has now been carried out in connection with the Port of Sydney. Over a large number of years the accumulated expenditure debited to the ports must include certain assets that have deteriorated, and their earning capacity is diminished on that account. It is desirable that the actual cost of maintaining the separate ports, based upon present value of the developmental assets, should be known, and the necessary steps in this direction are being taken.

During 1935 a beginning was made in the work of comprehensively overhauling the legislation that governs port control and navigation in New South Wales, and the first steps were taken in the direction of amalgamating the old Sydney Harbour

Eighth Interstate Conference of Australian Harbour Authorities—continued

Trust and the Navigation Department under the Maritime Services Board. This State now enjoys a system of unified control over the capital port and outports that we believe will lead to greater efficiency in the future. The establishment of an advisory committee at Newcastle enables proposals of local importance to be brought directly before the Maritime Board. In addition to that, legislation is now being prepared to bring up to date the code of laws that have governed shipping in this State, and the Government believes that the passing of this legislation will place the shipping services of the State upon an excellent foundation.

ably held on behalf of the Government of this State. But nevertheless, it is an honour to him and to us that he should have been the first President of the newly-constituted Maritime Administration in New South Wales. We know before he steps down from his position a few months hence, he will hand to the Government his recommendations for a complete new code of maritime legislation, to which I have already made reference. In constituting this Board at the beginning of 1936, the Government also made an innovation by inviting two well-known and experienced commercial leaders in New South Wales to occupy seats on the Board, and to give to the permanent



Circular Quay, Sydney, New South Wales.

During recent years, coastal railways and improved roads for motor traffic have set up strenuous competition with the shipping that in earlier days opened the coastal areas and developed the river trade. It seems probable, however, that coastal shipping will be required for many years to meet the demands of certain parts of the State where water traffic is still more convenient and more economical. The development of the outports is still a desirable policy, though the changed conditions of to-day render necessary the concentration of Government expenditure at points that may be described as commercially strategic. It may be that the Government will find it impossible in the future to maintain entrances at small ports and estuaries which are now supplied by rail and road, and where the division of trade renders the entrances less attractive for shipping than was formerly the case. The result may be that larger port improvement and increased shipping facilities will be located at a number of our ports which should become trade centres on the coast line.

So, in the deliberations of the Conference which now opens, you will, I am sure, do a great deal in determining the policy for the Governments of the several States that you represent in enacting legislation that will provide efficient harbour control for shippers, producers, and the public generally who use your ports. I have looked over your agenda, and have been agreeably surprised at the comprehensive range of subjects of vital interest to all Governments and to all port administrators, and the collective wisdom that will result from your deliberations will, I have no doubt, be of great value to the Governments of all the Australian States and of the Commonwealth.

I mentioned that we have established in New South Wales a Maritime Services Board which has jurisdiction not only over the Port of Sydney but over Newcastle, Port Kembla, and the smaller outports of the State, and that, for the first time, we have unified administration in maritime services. I mention that because the Government, after the legislation constituting the Board had been passed, was pleased to invite to accept the presidency of the Board, Mr. E. W. Austin, who is your chairman at this Conference. Mr. Austin accepted the position, after a very lengthy and honourable service to the Government of New South Wales, which, I understand, extends over nearly fifty years. Unfortunately for us and for the public of New South Wales, within a few months from now he reaches the age of retirement, when it will become necessary for him to step down from the position that he has so honour-

ably held on behalf of the Government of this State. But nevertheless, it is an honour to him and to us that he should have been the first President of the newly-constituted Maritime Administration in New South Wales. We know before he steps down from his position a few months hence, he will hand to the Government his recommendations for a complete new code of maritime legislation, to which I have already made reference. In constituting this Board at the beginning of 1936, the Government also made an innovation by inviting two well-known and experienced commercial leaders in New South Wales to occupy seats on the Board, and to give to the permanent

Medina Wharf, Cowes, Isle of Wight

A new wharf and transit depot at Cowes, known as Medina Wharf, have been constructed on reclaimed mud land for Messrs. Pickford, Ltd.

The wharf is supported chiefly on reinforced concrete piles, averaging 79-ft. long, with bearers, and a 9-in. reinforced concrete deck. The piles were driven through 55-ft. soft grey clay, 5-ft. silt, 10-ft. solid clays and 9-ft. of loose flints and clays to a firm bed on solid flint. The transit and loading platforms, which are constructed in brick and steel with slate, asbestos and glass roof covering, provide an open water frontage loading dock for boats, 220-ft. long and 10-ft. wide, with openings to the sorting and transit platforms, which are 30-ft. wide, and have a vehicle frontage of 195-ft., with wide overhanging canopies for loading up under cover, fully enclosed by steel roller shutters. The goods from boats are transhipped by two 30-cwt. electric derrick cranes and one 6-ton electric derrick crane, the goods having been packed in specially designed skips suitable for intensive loading in boats. The vehicle yard in front of platform (which has been raised to a level to prevent flooding at exceptional high tides) is of 8-in. reinforced concrete on 18-in. of solid rolled hard core, with bitumastic expansion joints, laid to falls and well drained, having an area of 27,000-ft. super. The two entrances are each 20-ft. wide, with steel collapsible gates.

A modern block of offices overlooks one of the entrance ways, and there is a single floor warehouse, 50-ft. by 20-ft., of brick and slate, supported on piers.

The depot is chiefly used for dealing with general goods road distribution in the Isle of Wight.

The piling was carried out by Messrs. Christiani and Nielsen, Ltd., the building work by Messrs. H. Stevens and Co., Ltd., of Southampton, the cranes by Messrs. Butters Bros., of Glasgow, under direction and to the plans, etc., prepared by Messrs. Pickfords' own staff.

The Port of Bordeaux and the Estuary of the Gironde

By M. F. LÉVÊQUE, Chief Engineer and Director of the Autonomous Port of Bordeaux

(Translated from the French)

(continued from page 18)

SPECIAL STUDY OF THE CONSOLIDATION OF THE SEA BOTTOM

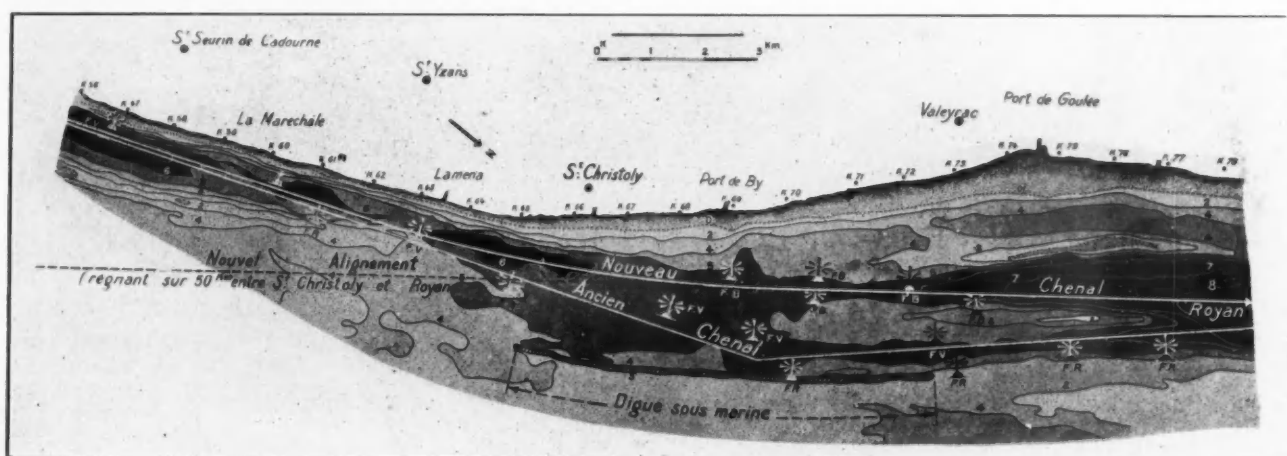
Liquid and Solid Discharges of the Gironde Process of Formation of Internal Shoals

This general geological study, which is carried on at the present time with the valuable assistance of the Professors at Bordeaux University, and in particular of MM. Daguin and L. Glangaud, allows us next to consider hydraulic questions.

In this connection it is desirable to recall the very interesting works, although partial in character, carried out for a century

great lengths and constituting extensive banks, of which the axis is roughly parallel with the direction, often identical, of the flood and ebb flows. These deposits are nowhere limited to the main bed of the river; they have been and are still much greater in the part of the bed adjoining the sides.

It is on the left bank, flat and sometimes marshy, that the lateral deposits are most evident. Quaternary littoral strips are still very visible, for example, along the road called "Passe Castillonnaise," which traverses the Communes of Valeyrac (Castillon to Saint Christoly) Saint Vivien and Soulac. Along the bank are found, what the frontagers call "vasières" or



New Channel across the Shoals at St. Christoly.

past by the Engineers of the Ponts et Chaussées in the Service of the Port of Bordeaux, and above all by the following:—

Pairier, from 1842 to 1847 (tides).

Prompt, from 1869 to 1873 (tides, currents and solid discharges).

De La Roche-Tolay, from 1875 to 1876 (improvement scheme for the Garonne between Bordeaux and Le Bec d'Ambès).

Comay, in 1876 (tides and bores).

Crahay de Franchimont, from 1876 to 1893 (tides, currents and volumetric measurements).

Vidal, from 1898 to 1912 (tides, currents, levels, groynes).

To these must be added the Chief Engineer Baumgarten (the Garonne studied from 1836 to 1844).

The volumetric measurements of the Gironde made in 1893 by Chief Engineer Crahay de Franchimont have shown that the tidal volume of water and solid matter, introduced by a tide of six hours into the river, varies between 1,200,000,000 cubic metres for neap tides, and 1,800,000,000 for spring tides, while at Bordeaux, the figures are only between 70,000,000 and 100,000,000 cubic metres, of which about 1/7th is constituted, excepting in times of flood, by the river discharge, properly so-called, arising from upland sources.

The enormous volume of tidal water in the Estuary sets in motion considerable volumes of transported material, which, according to the measurements made by the Engineers of the Ponts et Chaussées, Monsieur Prompt (1870) and Monsieur Crahay de Franchimont (1893), varies between 2,500,000 and 5,000,000 cubic metres, according to the co-efficient of the height of the tide. These Gironde figures are much more serious than the analogous figures for other French rivers, but much less than those of the Rio Grande, which often contain a percentage of solids in suspension amounting to 10%. It is therefore understandable in any case, in examining them, how there came to be formed such considerable deposits in the interior or at the exterior of the Estuary.

Deposits on the Banks

We proceed to study, first of all, the interior of the Estuary, that is to say, upstream from Pointe de Grave. Here are to be found recent superficial deposits of sandy mud, prevailing for

"crassats." These mud banks have, since Flandrian times, agglutinated round the Islet of Jau and the flats of Vensac, of the Temple, of Planquetorte, of Grayan, and of Talais. Between the main shore and the island banks existed immense stagnant pools of water and marshes covered with reeds; these constituted salt meadows covered only by the highest tides. Reclamation commenced in the 17th Century; the Dutchmen, Jan Cat and Van Bonel, produced in this way "the Dutch polder," under the inspiration of the Duc d'Epéron and of the brother of Montaigne. From 1739 to 1767, these salt meadows were surrounded by dykes. As for the area comprised between the high water of neap tides and the low water of spring tides, this was covered until 1847 with eel fisheries called "gords," mentioned in the Ordinance of 1669, located a little above low water at neap tides; these were not merely the only fishing plant possible on these mud flats, but the real factors in land reclamation which moved little by little towards the open.

In this way the reclamation of the Medoc was assisted, dried out and then dyked at a place where the Estuary had about 15 kilometres of breadth; it slightly exceeds 11 kilometres at the present time.

Therefore formidable volumes of muddy sand have collected around the primitive tertiary islets, whether by natural action or by human agency. These sandy, muddy deposits are not limited to the left bank, where they are observable from Pauillac and Saint Christoly as far as Pointe-de-Grave; they appear equally on the right bank from the zone where the chalk cliffs of this bank cease to be affected by the flood tide and by tempests. We are there in the presence of a serious work of nature itself, which has furthermore already been produced once in the past in the formation of the actual low grounds of Charente-Inferieure and of the Gironde below Blaye, where extensive marshes exist between an old bank of chalky cliffs and the actual seawrack of high tides. Such a natural operation explains why it is not possible for the Engineers at Bordeaux to conceive the installation of an outer harbour in this zone and especially in that of Talmont. It would have involved above all heavy dredging work, as well as being subject to the onslaught of tempests too numerous to permit reliable commercial operations. Throughout this region surrounding Mortagne it has been noted that over a dozen kilometres there has been deposited naturally on the right bank of the Gironde, without any

Port of Bordeaux and Estuary of the Gironde—continued

action of man, almost 2,000,000 cubic metres per annum and that for the last 40 years the only bank constituting the real shore towards Mortagne has grown naturally by about 80,000,000 cubic metres. There is already an accumulation that may be considered serious, although this precipitation has taken place much more rapidly on certain points of the Seine, such, for example, as the zone to the East of Fort des Neiges where, in 200 years the land has gained a kilometre.

Formation of Shoals

How do such estuary shoals form? It is here that can be usefully inserted the local geological information which I have summarised above. I recall that above the underlying geological deposits, formed by the Eocene (lutetian), the Estuary of the Gironde is, according to the result of numerous excavations and of our widespread dredging analysed by M. L. Glangeaud, covered by an alluvial quaternary bed which comprises three kinds of deposits:—

- (1) Muds, brown clays and fine sands, recent, occupying channels especially.
- (2) Pre-historic (Flandrian) deposits dating back 4,000 to 40,000 years, formed of pebbles, sands and clays, in part consolidated.
- (3) Lastly, in places and above all on the left bank as between Pauillac and Saint Christoly, or on the right bank near Blaye are to be found locally elements of terraces, quaternary without doubt, in any case anterior to the Flandrian.



Combined attacks of the Sea and of Pholades.

The important consideration, in my view, at least, is the partial local consolidation of pre-historic deposits in the channels. Even if not completely hardened, fossilised as the geologists say, they are more compact and solid than those of recent date and play a more important role in the distribution of shoals in the channels.

Methods of Consolidation of the Deposits

The deposits are consolidated in various ways: there can be cementation with or without crystallisation; or else the mud, more or less colloidal, can be transformed into clays of sedimentation. There can also be produced a phenomenon of physical cementation, which is comparatively little known and has been described very precisely by American and Dutch Engineers, especially by Mr. Wm. Twenhoffel and by J. J. Canter Cremers, member of the Institute of Engineers of the Hague.

Cementation and its Effects on the Mobility of the Beds

The hard deposits, consolidated by crystallisation or by a transformation of mud into clay or by the formation of cemented banks, have produced a modification of the regimen of the bed, they cannot be removed by the currents, whereas purely muddy banks are swept away. Thus in the channel they offer opposition to a natural deepening, and, at the sides they serve as a base for new banks which attach themselves to them, and can thenceforth develop slowly, regularising themselves under the action of tidal currents. It is to be noted that according to the recent experiments by Mr. Hégly on channels with a part

shallow and a part deep, the mean velocity in the shallow part, is, if the bed is covered with stones, nearly half of the mean velocity in the deep portion, while if the bed is of the same nature throughout the section, the mean velocity in the shallow part is about three-quarters of that in the deep part (see report to the Congress at Lyons, March, 1935). The consolidated beds are then generators of zones of supplementary resistance which cause a diminution of current velocity, then of supplementary deposits of flocculant products. These are favourable points for the formation of shoals.

Case of the Gironde Below Pauillac (Saint Christoly)

I have applied the preceding data to an investigation into the stability of the main navigation channel of the Gironde below Pauillac. The deeper portions were scoured to some degree as far up as Saint-Christoly, about 25 kilometres above Pointe-de-Grave, half-way between Pointe-de-Grave and Pauillac. The flow and ebb currents persistently followed different tracks, the flood tide bordering the left bank and the ebb tide wandering towards the right bank, within a zone in which the estuary has a width of from 8 to 10 kilometres. This divergence has been attributed to the movements of under-water shoals which bound, upstream and downstream, the area of shallow depths. This section ought to be regarded really as a rapid, notwithstanding the very slight inclination of the bed (of the order of 3 millimetres per kilometre) since it constitutes a very clear break in the general line of channel depths. The upper Garonne is, furthermore, characterised by similar formations, comprising local rapids which are produced by the out-cropping of rocks in situ or of substantial and stable beds of gravel. (M. M. Pardé, *Le régime de la Garonne*).

In an endeavour to divert the ebb tide to the line of flood tide, the idea was entertained of constructing a subaqueous embankment, which should catch the ebb at the passage and bring it back gradually to the left bank to join with the flood. This dyke or embankment lengthened in an upstream direction the downstream shoal, but while remaining parallel with the left bank, it left the upstream shoal definitely inclining towards the land. It was prudently decided to adopt the level —2.50, at which to level the dyke, which has been constructed of rather bulky gravels, extracted in front of the point of discharge, quite near to the left bank.

This dyke improved the currents to some extent, but had no effect on the shoals, which remain obstinately fixed at a level between —3.50 and —4.50 below low water. On this account, vessels descending from Bordeaux to the sea, which should clear at about high water the upstream passes near Bordeaux,

arrive towards mid-tide on the persistently permanent rapid of Saint Christoly. This unfortunate break in the navigation channel, in which, moreover, there are, for considerable widths, depths of at least —5.00 to —6.00 below local low water, made the shoal of Saint Christoly the veritable key of a troublesome exit for ships frequenting Bordeaux. The gateway was, furthermore, equally inconvenient for the passage of large ships going up towards Bordeaux.

I have studied, at close quarters, what happens in this zone of the stream; I had remarked that above Pauillac the depths on the left bank were such that frequently the contour lines were closely adjacent in plan: it was as if there were cliffs in the bed. It was known, moreover, that there were several limestone rocks in this region, by reason of unexpected contacts made by certain badly-manœuvred craft.

From this, I thought it would be possible to stabilise on the left bank the main channel with these abrupt definite changes of level by regularising them. In fact, indurated strata always attract the stable depths, and a series of soundings with local dredgings showed us that the channel was in reality a succession of rocky cliffs, nearly continuous, but interrupted in places; an unexpected rocky point was, in fact, discovered immediately alongside the left bank of the channel.

Furthermore, I have connected the fact that the subaqueous dyke of Saint Christoly has been formed by gravels extracted from the bank on the one hand, combined with the presence of fine gravels extending in thick masses under the adjacent plain of the Médoc, and on the other hand, with the probable permanence of the bottom in the rapid of Saint Christoly.

Port of Bordeaux and Estuary of the Gironde—continued*Erosion of the Argillaceous Beach, north of Soulac.*

The Upper Garonne is, in fact, frequently floored with gravels which increase in places through the building up of the bottom with transported materials of all dimensions. It would be possible to have the same result in the Gironde in front of the gravelly peninsula of the Médoc.

A series of excavations of the bottom with our large dredger showed at once that the hard bank forming the rapid at Saint Christoly included an alternation of rocky portions and of gravels partially consolidated and more or less argillaceous.

After having specially studied the question of the consolidation of these gravels, I thereupon embarked on the opening of a channel through the rocks in the rapid in such a way as to obtain at least —6.50 m. below local low water. The works are in hand, and the depths newly created are being maintained. The two cuttings upstream and downstream already meet. The new channel is going to be rectilinear over 50 kilometres of length, that is to say, over half the distance from Bordeaux to Pointe-de-Grave, but it deepens itself above and below the rapid.

In order better to appreciate the importance of such a result, it suffices to refer to the pilotage plans serving, for example, for the Elbe (Hamburg), the Weser (Bremen), the Mersey (Liverpool), the Thames (London), the Scheldt (Antwerp), where there can be perceived, one after another, changes of alignment with connecting curves.

There is scarcely any reason why this channel on a bed which is almost everywhere solid should not maintain itself practically clear if it is wide enough. Anyhow, the channel above Pauillac will be now constituted in such a way that it will be certainly and automatically stable, which is a great improvement from the point of view of important navigation, and at the same time it falsifies old prophecies, as pessimistic as they were ill-founded. We shall see afterwards what we are doing above the subaqueous dyke of Saint Christoly, which acts in a contrary sense to the natural upstream shoal to which it ought to be progressively connected. This dyke should now be regarded as the backbone of an immense regulating bank in the channel which it is essential to trace upstream. Dredging operations on the rapid of Saint Christoly have in every case shown with absolute certainty how natural it is that an important shoal should form by deposit on the site of a former rapid.

To begin with, the whole thing is built on lutetian rock, the same as that which constitutes the rocks of Cordouan and Saint Nicolas in the sea. Then, as in the case of the river banks in the neighbourhood, this rock has been, from the quaternary epoch, covered with a thick mantle of gravel of various dimensions. The whole of the rapid was submerged at an

unknown period, but not far distant from our own. The river has patiently accomplished its role of sifting the large material and cementing together the finer sorts. In places, indeed, one no longer finds anything but large stones, overlying the ordinary non-consolidated Médoc gravels. Elsewhere are to be found points of rock and some shoals of mud.

Most frequently the dredging brings up from 2 to 3 metres of depth, a group of elements containing mostly gravel and sometimes clay, of which all the upper surface is consolidated and indurated with or without crystallisation of calcite, accompanied sometimes by cementitious material of glauconite or of limonite. There are all gradations, from clay to sand or to gravel, with or without consolidation.

It appears clear now that a channel 500 metres in width is easily maintainable at a depth of —6.50 with perhaps certain movable deposits of slight importance consisting of mud, which can be easily and economically removed by our suction dredgers. The ascent, and above all the descent, of large ships frequenting Bordeaux will have gained a singular facility and at little expense, thanks to co-ordinated studies undertaken by the Port Service. We will continue further upstream our investigations which have already obtained this valuable result of a channel of navigation now become straight and direct from the Pointe-de-Grave for a length of 50 kilometres. Our hypothesis of the connection of shoals with consolidation zones is more or less shown to be a good working hypothesis.

The idea had perhaps prevailed too long in Bordeaux that in seeking channel improvement there was nothing to consider but mud and sand, water, currents and winds. We have found it necessary, however, to study the subsoil strata in order to learn how banks grow and change, and how excavation can be directed to achieve the object of a channel that shall be deep and durable.

GENERAL PHENOMENA**The Problem of the Outer Estuary**

Let us now see what happens outside. In the neighbourhood of the mouth of the Gironde, we have again come across the double phenomenon common to all marine erosions: that of the eating away of the ancient rocky or sandy coast by the sea, and that of alluvial deposition in calm zones. The sea eats away the land, but the land fills up the sea.

The process of erosion by the sea may be more or less facilitated by the eustatic movements of the ocean—the relative movements of land and water which are thought to have occurred on numerous occasions during the quaternary epoch and which are now generally accepted since the work of Deperet and Dubois on marine terraces.

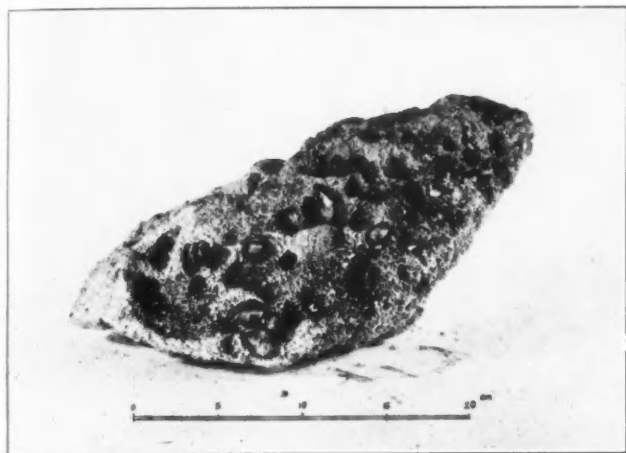
Port of Bordeaux and Estuary of the Gironde—continued

Along the Atlantic Coast

The general phenomenon of alluvial deposition belongs to the last stage of the quaternary period, the Flandrian, which has superimposed its alluvium upon the previously deposited sand of the Landes, and which represents a complete sedimental cycle, that is to say, the succession of a period of hollowing out followed by a period of filling in, which is still in progress.

As regards the erosion of the external coast of France in the neighbourhood of the mouth of the Gironde, it is only part of the general erosion shown on the lithological maps (that of Delesse, for instance) of the French sea-coast along the Atlantic Ocean and the English Channel.

Reference to the Marine Maps enables one to trace the location of the old sea-shore lines, either by islands, such as Ré, Oléron, Noirmoutier, or by lines of sea-shells (the Petite Sole, on the seaward side of Ushant), or zones of boulders or blocks, as in Brittany, or of shingle as in the Gulf of Gascony, in Vendée, in Ferrière. Much still remains to be done, however, before we can have a reliable submarine geology and be able to extend under the sea our geological surface maps and interpret the forms of submarine relief. This is a task for the future, as we are reminded by M. Dangeard.



Pholades at work in Limestone at St. Nicholas.

The Question of Fault, or Fold

But there are other important questions to study in connection with the Gironde. Is this river, the direction of which is remarkably stable, located in a geological fault or in a fold? The problem is important in connection with a determination of the degree of stability of the position of the estuary, which would be more settled in a fold than in a fault.

The cliffs of coarse limestone at Blaye, of Upper Lutetian, running along the Saintonge, might, as on the edge of the successive beds around Paris, be merely an out-crop which has assumed its cliff-like appearance from constant erosion by sea or rain action. A fault valley must disclose a depressed internal zone, for there the crushed material has less resistance. This hypothesis rests on the fact that the Western part of the Central Plateau is frequently bordered, on the Aquitaine side, by faults lying in the direction of Brittany and imposed upon older folds.

There is, however, a tendency now to admit that a fault valley so far away from the Central Plateau would be an exception. Valleys are more often parallel with folds in countries where folds are due to the application of external forces. Softer material has been met with on the surface, but not lineally as in a fault. No doubt the tertiary basin of Aquitaine may have been folded in the Gironde, by subsequent folds, or covering folds, when the Alpine orogenic movements took place which dislocated the Central Plateau and raised its Rhodanian slope.

On the other hand, the tectonic movements of the Pyrenees played a definite role in the Aquitaine towards the close of the Eocene period. They caused anticlinals, and in particular the more or less elongated "Domes" which border the sides of the Estuary of the Gironde, such as the Dome de Blaye.

In this connection, it should be noticed that even alongside the Dome de Cordouan—St. Nicholas are to be found great hollows of 50 to 100 metres in depth at least, filled in with fine grey sand, more or less silty, shelly and gravelly, both at La Claire, North of St. Nicholas, and at Verdon, on the site of the landing jetty. The contours of the rocky beds of the Bas-Médoc, towards Pointe de Grave, present a very contorted appearance, and will have to be closely studied. The work is already in hand.

STUDY OF SILTING, COLLOIDAL MUD

What is happening on the bed of the Gironde from the point of view of the deposit of mud or silting? The river derives

from the erosion of the lands through which it runs, the supply of solids which it carries in suspension. These are made up of a variety of elements, sorted by the currents, and in their progress downstream they decrease in individual weight while changing their consistency.

The Garonne feeds itself in part by means of the rapid currents of its flood waters. It would seem (according to M. Pardé) that it has nearly attained, as regards its bed, a settled profile, with only local variations, more or less alternating.

Part of the material resulting from erosion is colloidal. All natural processes of decomposition of rock bring about residues of more or less colloidal quality.

The residues carried by water, whether colloidal or not, are nevertheless solids, of which traces are left on the shores of rivers and in bank formations, which are more or less gravelly, sandy, or muddy. These banks are formed in accordance with certain laws, which are beginning to be understood, as regards rivers, through the researches of Fargue, Franzius and Girardon, but which are still practically unknown in regard to the outer part of marine estuaries, where we find simply deposits, mainly rectilinear and massive, attached at points where the subsoil is sufficiently firm or consolidated.

Let us examine the lighter or more movable deposits, which have been studied by the Finnish Geologist, T. Brenner. The finest particles which are in suspension in the waters of a river, have a particularly minute grain, and in the case of argillaceous substances properly so-called, distinctly plastic properties. Owing to the extreme fineness of the particles, water clings to them with great tenacity, and the substance thus becomes more or less analogous to a colloidal "gel," of which it has the plasticity. It is known that, in colloids in suspension in water, each solid particle is wrapped in a coating of liquid firmly adhering to its surface, the mass thus acquiring considerable viscosity. When the particles come sufficiently close together, as the effect of gravitation or sedimentation, their liquid envelopes may come in contact and attach themselves firmly to one another by the process of mutual attraction. We have then coagulation of the suspended particles. Equilibrium is then established between pressure, which tends to expel water by the weight of superposition of layers, and attraction between water and the particles, which tends to keep the water attached to them. The quantity of water which remains may vary from 30 to 50 per cent. in volume.

Divers have found very clear indications of this progressively colloidal consistency in the sandy mud bottom of the Verdon roadstead, where there is a gradual passing from water holding brownish or reddish clay particles in suspension down to the bottom deposit, which can support the lead of the sounding-line.

Colloidal materials agglomerate, coalesce by flocculation, and then precipitate in the course of their journey to the sea, to which they are carried and in certain calm zones of which they may form banks of considerable thickness. At the mouths of the Mississippi, such banks are found of 2 to 3 metres in thickness.

When the upper layers of such movable deposits emerge above the level of the water, they lose their water content by evaporation, down to a certain depth, which is more or less as the particles are finer or coarser.

Dried clay is very different from its original state at the time of sedimentation. It possesses much greater cohesion on account of the contraction of its pores. When water spreads over dry clay, as happens on tidal shores, the water is generally absorbed and displaces the air in the clay, which swells up. The phenomenon takes place with some violence and brings about dislocation of the substance, which is not of uniform hardness. Clay which has thus been covered afresh with water takes on again a plasticity analogous to that which it had at the sedimentary stage, before drying, but it loses some of its consistency and firmness owing to the internal dislocation which it has suffered.

This explains clearly why the layers of blue, green or brown clay, whether quaternary or contemporary, which are uncovered on the shore by the action of the waves, break up so rapidly and so irregularly, once the sand which covered them has disappeared. This phenomenon can be observed, for instance, at the Pointe de Grave, and enables one to understand the rapid progress of a stormy sea on those shores, once the underlying clay, above low-water mark, has started to disintegrate.

As regards the blue clays, of relatively ancient formation, which were deposited many centuries ago behind a string of dunes which were then farther to the westward, and which found themselves attacked no longer by the Gironde but by the sea, the phenomenon is clearly marked.

The banks situated within the estuary do not show so clearly the same phenomenon, for they are of too recent a formation, retain still their colloidal water, and are not so much exposed to storms.

(To be continued).

Bombay Port Police

Being an account of certain Police activities in the Bombay Port Trust Docks

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To the casual observer, it might appear that the task of policing the docks in Bombay is not one calculated to tax too severely the energy or ingenuity of the men to whom it is allotted. It must be admitted that the Dock Police have this advantage over their confreres—they exercise supervision over an area which is strictly limited and totally enclosed. Entrance to and exit from their jurisdiction is under constant observation, day and night, and they are able to obtain the instant co-operation of the customs authorities when necessity demands. This does not mean, however, that the Police employed in the docks are idle, or that their duties are less responsible than in



Police Parade at Yellow Gate Station.

other parts of the city of Bombay. It merely serves to emphasise the fact that their activities are concentrated on and devoted solely to the interests of the Port Trust. Seeing that the Port Trust makes an annual contribution of over a lakh of rupees yearly towards the maintenance of the Dock Police, it will not be denied that this attitude is correct.

That the policing of this area is a task not to be taken lightly is evident from the fact that one Police Division—H and I of the Bombay City Police—amounting roughly to just over 500 men, or about one eighth of the total Police force of the city, is posted for duty in the docks. Police are not specially recruited for this work, the only exception being the tindals in charge of the Police launches and the launch drivers, the former being in possession of Port Trust certificates, while the latter are skilled mechanics and drivers.

Police work in the docks can be classified under three main heads, Flotilla, Watch and Ward, and Port Health and police activity under each head is set forth as follows:—

Flotilla Police

Flotilla, or the Harbour Police as they are more familiarly known (H Division of the Bombay City Police), have a sanctioned strength of 58 all told. Their jurisdiction extends to high-water marks within Port Trust limits, and to all Bunders. The Police launches, four in number, including one large Monsoon launch, are used for harbour patrols by day and by night, and by the passport examining staff of the C.I.D. when they wish to board a vessel in the stream. The launches also bring or tow ashore any dead body floating in the harbour, which is later despatched to the Morgue for the purpose of completing the legal formalities with its finding.

They are also frequently called to the rescue of persons who have fallen into the sea, and are often sent out on all manner of odd jobs. During the stay in Bombay Harbour, a few years ago, of a French transport conveying details of the Foreign Legion to the Far East, the launches were on duty day and night patrolling round the steamer, to ensure that anyone who may have been tempted to jump overboard, would be speedily returned to the ship. Quite a number of gentlemen of spirit managed to get overboard in an effort to desert the vessel, but only three escaped police observation. One landed at Apollo Bunder, but the other two were picked up down the coast by fisher folk, and handed over to the District Police, who despatched them to Bombay, whence they were eventually repatriated to their respective homes.

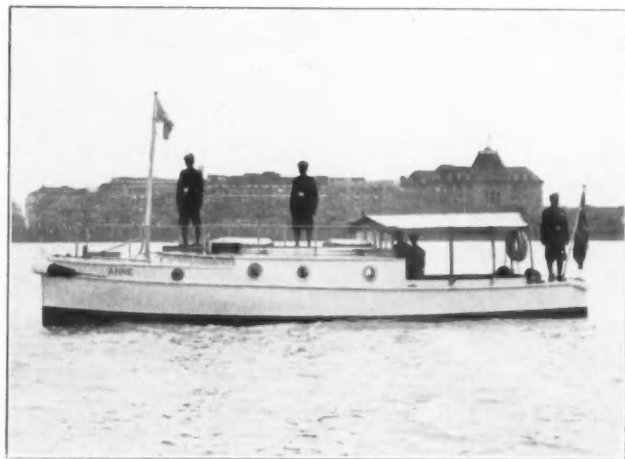
In addition to the constabulary necessary to man the police launches, the Harbour Police supply five Head Constables for duty with the Superintendent of the Port Trust Harbour Police

Patrol. This patrol, in co-operation with the police patrol, ensures that the channel is not obstructed by fishing craft during the day, and that country craft do not approach vessels entering the harbour until they have been tied up or are at anchor. By night these patrols move around the harbour, on the look out for country craft navigating without lights. Quite a number of these cases are recorded and disposed of during the year, but in spite of the fines which invariably follow the conviction of owners or tindals, there is little or no diminution of the nuisance. It seems impossible to make this type of person realise that the fine is imposed as a corrective. They look on their arrest as an evil which has to be endured, and on the fine as a levy imposed by Government on poor seafaring folk. They cannot see the folly and danger of fishing the channel in the path of an incoming liner, or of navigating the harbour at night without lights.

The Harbour Police are also responsible for the manning of all passenger bunders, and constables are supplied for continuous duty at the Apollo, Ballard, Malet and Mazagon Bunders. Life on these fixed posts is dull and boring in the extreme, for there is little to do, and it is rarely that anything interesting happens. Preferable by far is life with the harbour patrol, for who will deny that there is a subtle fascination about Bombay Harbour, especially by night, although we have not here the mystery and adventure associated with the London River Police nor the excitement and danger of rum-running in America's Prohibition days!

Watch and Ward

The Dock Police—I Division of the Bombay City Police—furnish the bulk of the men employed within the jurisdiction of the Bombay Port Trust, there being a sanctioned strength of 12 officers, including the Superintendent of the division, and 461 constables. They work entirely within Port Trust limits, and although the duties they perform are of a police nature, these duties are solely in the interests of the Port Trust. Crores of rupees worth of valuable cargoes are unloaded and stored alongside berthing places in the docks, and police vigilance over these is unceasing. During the day constables are posted at all important points throughout the docks, and every shed, the number of men to each shed being determined by the nature of the goods stored within, and by the fact of its being open or not. Constant patrols move round during the day, seeing that the men are on their posts and that all is well. At night, when work is done, and noise and bustle are stilled, there is a night patrol, the Flying Squad, always on the move, examining the shadows, poking inquisitive noses into dark corners, and giving little or no chance to a lurking thief. Serious crime in the docks is practically non-existent, and this is partly due to the unceasing vigilance and the constant patrolling for no more effective means has been, or can be found, of keeping down crime than by keeping down the criminal. Another fact that militates against the perpetration of successful crime of a serious nature in the docks, is the difficulty of leaving the scene of offence without the risk of immediate detection. Stolen property cannot be taken out except under the noses of the



Harbour Police Launch "Anne."

Customs, the Port Trust and the Police at each gate, and no self-respecting criminal would attempt to leave by one of the gates, on foot, with the proceeds of his crime on or about his person. This clumsy method is left to sneak thieves who pocket money or small valuables which cannot be immediately detected, and to amateur arms and drug smugglers. These latter are almost invariably detected, either by the police whilst leaving the ship, or by the customs men at the gate.

All large passenger vessels, and all vessels carrying valuable cargoes are boarded as soon as they tie up by plain clothes constables. These men tour the vessels at intervals and see that no known bad characters are aboard, and that no attempts

Bombay Port Police—continued

are being made to interfere with the cargo, or with the cabins of either passengers or crew. They remain on board until the departure of the vessel, or the unloading and safe disposal of the cargo.

Constables are posted at every gate of the docks during the day, and on such gates at night as remain open. They keep a look out for suspicious characters entering or leaving the docks, and challenge and search anyone who appears to be such. They also assist the Customs and Port Trust gate men, as far as they are able, when called upon.

Traffic control inside the docks is undertaken solely by the dock police, and these traffic constables are not connected with the traffic police of the city. The normal traffic running through the docks daily is sufficient to warrant the employment of traffic police to control it, and on occasions, such as the arrival of a pilgrim ship at Princes Dock, or passenger liners with a large complement of passengers at either Ballard Pier or No. 18 Alexandra Dock, special arrangements have to be made to cope with the rush. At Ferry Wharf serious congestion of traffic is a daily occurrence, but this is to be relieved to a great extent by the widening of the road as much as is possible.

Progress through the docks now-a-days is not the nightmare it used to be some years ago, when strings of bullock carts meandered along the road, heedless as much of the rule of the road as of the blasphemous abuse showered on them by others less disposed to dally. The motor lorry, snorting, squeaking, jolting its painful way along, often grossly overloaded, mostly uncared for and in bad repair, now cuts up the roads laid down with such care, and who is to say which of the two is the greater evil? Lorries are forbidden to carry loads in excess of the maximum painted on the off-side of the vehicle, but frequent prosecutions take place for violation of this rule. Here again, in spite of these prosecutions and convictions, there is little or no improvement, and it seems that, by lorry owners and drivers too, the Dock Police are regarded as an evil that must be endured.

Both at Ballard Pier and at No. 18 Alexandra Dock traffic congestion is enormous at times. Ballard Pier traffic can usually be cleared within a reasonable time, owing to the good approaches and ample parking places, but a rush of traffic at No. 18 Alexandra Dock means an unhappy time for the traffic police there. The approach is bad, and parking places practically non-existent. Prowling gharries, taxis, private cars, lorries, mail vans, and other miscellaneous shore craft sprawl all over and round the only available space, and the wonder is that order is ever restored out of chaos, and traffic sorted out and sent about its lawful business in good time.

To the docks come, too, unhappy homesick men, deserters from British regiments, vainly trying to get home. Some attempt to form a friendship with one of the crew of a British vessel, preferably a tramp, and induce him to hide them on board until the vessel has sailed. Others attempt to get on board without an accomplice, but not many succeed.



Directing Traffic at Ballard Pier.

Many and fanciful are the tales told to the Police when they commence to interrogate a suspected deserter, but the prize goes to the cavalry trooper, who stated some years ago that he had deserted his ship, the s.s. "Leviathan," on which he had been a stoker, at Karachi, and had come to Bombay by riding on the buffers of a train. This, too, to an officer of the C.I.D. in Bombay, who was fully conversant with the nature of the shipping of the Ports of Bombay and Karachi, and was himself an ex-cavalry trooper!

The Port Health Staff

The Sanitary Police to the rest of the Force—comprises two officers and a small staff of 8 men. They are directly controlled

by the Port Health Officer whilst subordinate, of course, for administration and discipline to the Commissioner of Police. They enjoy the distinction of being paid overtime for working on Sundays and holidays, and out of normal hours, and are a source of constant envy to financially embarrassed comrades, who often work overtime by day and night, on Sundays, holidays and all other days, without thanks, let alone payment.

The Sanitary Police, with the Port Health Officer or his assistants, board all ships arriving in quarantine. They also attend the inspection by the Health Officer, of the crews of all ships leaving Bombay for foreign ports. Deck passengers for foreign ports, and all native crews of foreign-going vessels are inspected at the Disinfection Sheds at Wadi Bunder. Pilgrims are inspected on board the ships on which they arrive, and are lined up for inspection by the Sanitary Police. Outgoing pilgrims are inspected at the Disinfection Sheds.



Approach to Ballard Pier.

When a case of contagious or infectious disease is detected on board a vessel, the Sanitary Police are responsible for the disinfection of the bedding, clothing, luggage and person of all contacts, and also for that portion of the vessel which may have become infected.

Men are posted at the foot of the gangways of all passenger vessels calling at Bombay *en route* for the Far East or Australia. They are on duty until the ship sails, often for twelve or more hours. Normally about 10 per cent. of the crew, and all through passengers are allowed ashore during the ship's stay in port. There are times, however, when Bombay is declared an infected port, and then the entire crew is restricted to the vessel, whilst through passengers are allowed ashore at the discretion of the Port Health Officer, who may forbid their landing altogether. A restriction of this nature is naturally not popular, and the Sanitary Policeman on the gangway leads an unhappy existence for the time he is on duty. It falls to his lot to explain to the imprisoned voyagers that the Port Health Officer is not actually what they say and think he is, and that in any case no evasion of his order is possible.

Lack of space has made it impossible to attempt a detailed description of the daily routine of the Dock Police, and indeed, this is usually too humdrum to be interesting. It must not be assumed either that the Dock Police do nothing beyond what has been stated here. In times of civic amity, life flows peacefully along its ordered and perhaps not too strenuous way, but with the first muttering of discord, between citizen and citizen, when muttering has grown into snarling savagery and death stalks the highway, from the docks go reinforcements to the aid of harassed comrades. While disorder lasts and every available man is out, those left behind in the peace and security of the docks must do double their normal share of duty—and more than that if need be. And it is done, as the other duty is done, cheerfully and well, till tranquillity is restored and confidence re-established. That is the manner of the Bombay Police.

W. G. K.

American Association of Port Authorities.

The following officers and committee were appointed at the recent annual convention of the American Association of Port Authorities held in Wilmington, Delaware:—

Officers:—President: Finley W. Parker, Galveston, Tex; 1st Vice-Pres.: George W. Osgood, Tacoma, Wash; 2nd Vice-Pres.: J. Alex. Crothers, Camden, N.J.; 3rd Vice-Pres.: Elói J. Amar, Los Angeles, Calif; Secy.-Treas.: Tiley S. McChesney, New Orleans, La.

Executive Committee:—George W. Osgood Tacoma, Wash.; Charles H. Gant, Wilmington, Del.; R. O. Campney, Canada.

Singapore Air Port, Slipway and Wharf

The new airport at Singapore, recently opened by the Governor, His Excellency Sir Thomas Shenton Whitelegge Thomas, G.C.M.G., O.B.E., is the most important overseas air base of the Empire. It is both a land and sea station, and differs fundamentally from most other airports in the world.



General view of Singapore Airport, showing landing ground and in the distance the seaplane slipway and anchorage.

The landing ground, which occupies some 162 acres out of a reclaimed area of 262 acres, is of circular shape and 1,000 yards in diameter. Owing to the rainfall in this territory (95-in. per annum) some forty miles of special subsoil drainage has been undertaken, the landing ground being slightly mounded, with a gradient of 1 in 160. The buildings have been arranged with a view to reducing obstructions to aircraft to a minimum, and the layout permits a full run of the ground in any direction. The terminal building, with hangars on either side, caters separately for inward and outward traffic, and possesses a post office, telephones, restaurant, bureau de change, passport, medical and customs sections, also offices of the principal navigating lines, as well as for the airport staff, together with the usual travel amenities such as newspaper, tobacco and refreshment kiosks, etc. The control cabin, from which all aircraft traffic is regulated, is some 50-ft. high, and is reached by a lift, possesses a fully-equipped radio station.

The lighting of the aerodrome is operated from the control tower. Orange-coloured boundary lights are spaced at intervals of 100 yards round the landing ground, and red obstruction lights have been installed on the buildings. An illuminated wind tee, and six G.E.C. airport floodlights evenly spaced for illuminating the landing surface, and other floodlights for



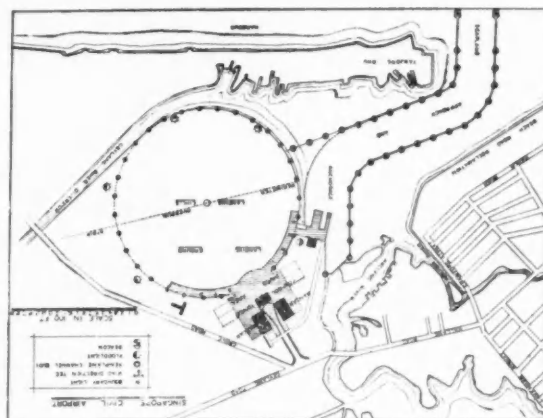
One of six landing floodlights installed at Singapore Civil Airport for illuminating the channel when necessary for seaplane and flying boat operations

general illumination round the terminal building and hangars have been installed. On the roof of the control tower is a Neon beacon for the guidance at night of approaching aircraft, which will receive additional assistance from a device whereby the beacon can, at the will of the control officer, flash in morse code the letter "S" for Singapore.

The electric lighting of the seaplane channel and anchorage is also operated from the control tower. This particular installation was carried out by United Engineers, Ltd., who

were responsible for the fitting up of the Express-SMS lift with which the Terminal Building is equipped.

The two hangars for aeroplanes at present constructed, each measure 300-ft. by 150-ft., with a clear height of 35-ft., and are capable of housing comfortably the largest air liners yet built. Each hangar has two entrances, arranged in such a way that the handling of aircraft in a crowded hangar is simple. A two-storied annexe runs along the full length of each



Plan of Singapore Airport.

hangar providing accommodation for offices, stores and workshops of air transport companies. Road access to these annexes is separate from the approach road for passenger traffic.

On the western perimeter of the landing ground are the seaplane slipway and wharf. The slipway, which has been designed for a load of 84 tons, is 100-ft. wide, and is inclined at an angle of 1-in. in 15, its total length being 262-ft. The end is submerged to a depth of 5-ft. below water level at extreme low tide. Four lines of rails, laid flush in the concrete decking, are available for hauling up any flying boat which may need to be taken from the water for overhaul or repair. At the head of the slipway is a level paved area for the handling of flying boats and seaplanes, this area being connected by a taxi strip to the main hangars. Should future development render it necessary, a hangar will be erected at the head of the slipway for the special use of marine aircraft.

The wharf provides a convenient means of transshipping passengers, mails and stores to marine aircraft. A two-ton electric crane will be available on the wharf for the handling of aircraft engineers and heavy stores.

The waterway from the slipway to the open sea is a dredged channel 600-ft. wide, about a mile in length, and having a minimum depth of 6-ft. at low tide. The channel is flanked on either side by a continuous timber boom, designed to exclude floating debris and other obstructions. At night it is defined by electric lights at intervals of 300-ft., terminating at the seaward end in two buoy lights. These buoy lights are operated from the control tower of the Terminal Building.

Other features of this new airport are a fully-equipped meteorological station, premises for the Royal Singapore Flying Club, sites for oil companies, garages for staff and visitors' cars, etc.

The major part of the work was carried out by the Public Works Department, the general administration of which has, in accordance with departmental procedure, been in the hands of the Deputy Director of Public Works, a post occupied until 1935 by the present Director of Public Works and Director of Civil Aviation, Major R. L. Nunn, D.S.O., A.M.I.C.E., M.Inst.W.E., and then by Mr. C. J. Parker, M.C., M.Inst.-C.E., and in his absence, by Mr. S. J. W. Gooch, M.Inst.-C.E.

The seaplane channel dredging was carried out under the supervision of Mr. J. B. MacLachlan, A.M. Inst. C.E., the senior executive engineer, rural and marine, with Mr. I. Harpur in charge.

The main electrical installation was carried out by Messrs. John Morley and Co., and part by The General Electric Co., Ltd., all being under the direction of Captain G. H. N. Reay, A.M.I.E.E., the Government Electrical Engineer.



One of the channel buoy lights for indicating water area navigation space to seaplanes.

The Port of London Authority and Wharf and Warehouse Registration

At the Monthly Meeting of the Mansion House Association on Transport at the end of October, the proposals of the Port of London Authority to secure statutory powers to deal with the registration of wharfingers and warehouse-keepers on the river front were explained at length by Sir David Owen, the General Manager of the Authority. The following is a summary of his address.

After a brief résumé of the conditions and events prior to the Port of London Act, 1908, Sir David suggested that the creation of the Port Authority, which could be described as a monopoly with limitations, and the granting of powers of compulsory acquisition, were part of a definite policy. In carrying out the original intention of Parliament there was always open to the Authority the policy of using all their resources to kill private enterprise—such a policy had been followed ruthlessly in other countries—but it had never appealed to the P.L.A.

He pointed out that the Port Authority is already a licensing body, having power to license works and premises below the line of High Water or Ordinary Tides, and it was thought that this principle which was so well established could, by slight modification, be extended to premises which do not require to project beyond High Water mark. The Authority has now to go to Parliament for the purpose of enlarging its borrowing powers, and it was felt that this was a suitable opportunity to make proposals for dealing with warehouse-keepers and premises on the river with a view to securing the original intention of Parliament, without detriment, it was believed, to the interests of traders. With a system of licensing or registration there must be conditions, and it was proposed that such conditions should cover (1) condition of premises, (2) payment of standard wages, and (3) adequacy of charges.

Standardisation of Charges

With regard to this last point, Sir David Owen went on to say that they had not yet made up their mind what should be described as adequate charges. There was always the fear on the part of the trader that anything which seemed to tend towards the elimination of private enterprise made for additional expense to himself, although it was believed that in recent years traders had been rather more concerned to secure uniformity in the matter of charging. "The Port of London Authority, far from having become a monopoly without a soul, has become really a benevolent autocracy—and in the matter of charges, we are an absolute democracy." He added that the Authority was going to spend £12,000,000 on improvements, in order to keep the port abreast of the times—to secure an increase in the enormous trade of the port, and without an

enterprising port authority traders themselves would suffer. The business of London depended upon the port being made adequate to meet requirements, not only for the present, but in the future. It was in all their interests that the port should be made as efficient as possible to induce more trade, all of which was to the benefit of the private trader.

In reply to questions, Sir David Owen said that one could not compare the charges at the Port of London with Continental ports, which were subsidised by municipalities and others. So far as this country was concerned, he thought that it could not now be suggested that for the same services London was any dearer than Liverpool, which was the only comparable port. With regard to bonded facilities, the granting of these was in the hands of the Customs authorities, and there was no intention in the present proposals to interfere with the functions of H.M. Customs. It was intended that registration should apply to public wharfingers only; private wharves would not be affected, and there would, of course, be a right of appeal to the Minister of Transport. Several members present expressed the fear that the proposals would tend to an increase in charges.

The Wharfingers' Views

Continuing the discussion of the proposed Bill at its November meeting, the Mansion House Association invited Mr. C. V. B. Read to explain the attitude taken up by the Federation of London Public Wharfingers.

Mr. Read pointed out that the proposals of the Port of London Authority provided for licences to be granted in respect of premises, and since many wharfingers are not property owners, but tenants, paying many thousands of pounds in rent, their position may be open to exploitation.

Having regard to the restrictions imposed in one of the clauses whereby alterations and additional premises would only be granted to adjacent premises, it was feared the position was aggravated so much as to amount to an embargo on expansion by public wharfingers in the normal course of business.

Reference was made to the Port of London Authority's powers for compulsory acquisition, and it was estimated that at the present time this would cost some 260 million pounds. Mr. Read suggested, however, that the proposals in their present form would gradually eliminate many of the public wharfingers, and make compulsory acquisition of the remainder a practical possibility. He went so far as to suggest that such an objective could be achieved in 15 years.

Some system of inspection of premises was desirable, but this might be left in the hands of local authorities, and the question of wages should be dealt with by the Trade Unions. If, however, any wharfingers without exploitation of labour or use of undesirable premises could reduce his charges, by mechanisation or other means, he should be entitled to do so, and not be bound by a uniform system of rates.

Port of Liverpool Trade and Shipping

At a meeting of the Mersey Docks and Harbour Board, held on November 18th, 1937, the Chairman, Sir Richard D. Holt, Bart., made the following statement:—

The year ending July 1st, 1937, has been even more satisfactory than the previous year.

The tonnage of vessels entering the Mersey has passed all previous records, the total being 21,399,499 tons—just surpassing the previous record of 21,314,820 tons made in 1930.

It may be interesting to note that in 1937 the number of vessels was 19,135, as compared with 20,771 in 1930. The number for 1937 was exceeded in 1845, when 20,521 vessels of 3,016,531 tons entered the port—the maximum number of vessels was in 1905 when it reached 26,065 with a tonnage of 15,996,387. This illustrates the great increase in the size of the average ship, which in 1905 was about 600 tons, while last year it was approximately 1,100 tons.

Another interesting feature is that during the financial year 8,600,321 tons of imports, other than coastwise, were handled on the Dock Estate in Liverpool and Birkenhead. In 1936 the corresponding figure was 7,881,530 tons, and in 1930 it was 7,279,473 tons.

During these years there has been a substantial change in the direction of the trade of the port. In 1925 the rates on goods coming from or going to the East Coast of Canada and the United States amounted to 25 per cent. of the revenue from goods, whereas in 1937 the corresponding figure was 14 per cent. On the other hand, the corresponding figures for Australia are 4 per cent. and 8 per cent., for Brazil and the Argentine 11 per cent. and 15 per cent., for Africa 8 per cent. and 10.5 per cent. These figures show that our trade is always changing in character, and that our traders must be ever ready to adapt their methods to altered circumstances.

The revenue from rates and dues increased by £100,000, and there were slight increases in the minor sources of revenue except the warehouses, but when goods are going into consumption rapidly warehouses cannot expect to be very profitable.

Expenditure on interest has been reduced by nearly £60,000, but the cost of wages and materials has been going up and seems likely to increase even more during the present year.

At the end of the year the Board felt justified in making a further reduction of 2½ per cent. in the dues on ships—but in spite of this, the revenue for the present year shows a substantial increase over that for the corresponding period of last year.

In June last, we decided to help the Coasting and Cross-channel trade, which is still expanding, by constructing a deep-water entrance at the Waterloo Dock and converting the Princes Graving Dock, which has been out of commission for a long time, into a wet dock giving good accommodation in the centre of the town. This work is progressing satisfactorily.

The work on the channels is going on steadily, and we have every reason to be satisfied with the results obtained.

The trade of the port has been greatly helped by our officials, who have performed their work with ability and loyalty, and I tender them the thanks of the Board.

Montreal Harbour Improvements.

The Canadian National Harbours Board has invited tenders for the reconstruction of part of the Alexandra Pier in the upper harbour at Montreal. The downstream face of the pier will be raised several feet in front of sheds Nos. 4 and 6, which at present are almost level with the face of the wharf. Shed No. 5, on the upper side, is being extended to the river end, and cylinders will be sunk in front of the sheds and will then be filled with cement to form the foundation for a broad apron that is to run along the entire face of the pier.

Congress of French Seaport Interests

The Congress of Seaports organised by the Association des Grands Ports Français and the Union of Maritime Chambers of Commerce in connection with the Paris International Exhibition, was opened on November 8th, under the Presidency of Monsieur Queuille, Minister of Public Works.

Senator Le Trocquer, former Minister of Public Works, President of the Association des Grands Ports Français, explained the object and importance of the Congress. He said:

At the present moment, according to all appearances, there is clear necessity for adjusting our balance sheet; the Exhibition has already contributed to this end, but to achieve full success, it is essential to develop our external commerce, and exports.

All that will improve the equipment of our ports, everything that will enable the French Mercantile Marine to play in the national economy the part for which it is intended, everything which will foster interchange with our overseas possessions, will contribute directly to the resuscitation of our external commerce. These are all questions which appear in the agenda of the Congress.

The Seaport Congress, emphasised M. Le Trocquer, comes opportunely. But its results would be nugatory if the combinations which have organised it, if the bodies which manage the ports were not assured of the collaboration of the Public Powers to achieve the programme which will be indicated.

M. Queuille expressed his agreement with President Le Trocquer. He regretted that circumstances forced a slackening of the works necessary for the maritime equipment of the country. In any case, he added, maintenance work would be guaranteed.

In estimating the possibilities of improvement in the economic and financial situation in France, thanks to the establishment of an imperial policy of exchange with the colonies, the Minister of Public Works pointed out the differences which exist in this respect between France and Great Britain.

In order to surmount actual difficulties, he concurred in the necessity of a general political union, and of the collaboration of all parties of the nation with the Government and the great public administrations. He commended the utility of the Seaport Congress: its conclusions in the different spheres of maritime and port activity would shape a course for the future.

The first Congress Commission on Equipment met under the chairmanship of Monsieur M. Geistdoerfer, President of the Commission of Mercantile Marine of the Chamber of Deputies, and of the Group of Deputies of maritime and fluvial ports. In opening the sitting, M. Geistdoerfer recalled the particularly difficult situation of the French Mercantile Marine in undergoing simultaneously the effects of an economic crisis, and of a

social crisis in addition. He indicated the steps to be taken at the moment when the great nations, and especially the United States, were initiating most important measures for developing their commercial fleets, and when the question of the connection of maritime navigation with aerial navigation was becoming most insistent.

Monsieur Marchegay, General Secretary of the Central Committee of French Shipowners, presented a suggestive report on the problems which confront the French Mercantile Marine.

After pointing out the rapid fall in tonnage of the commercial fleet and its obsolescence, he showed that the French Mercantile Marine was experiencing, like all shipowners, an economic crisis, but that it was, in addition, handicapped permanently by the social obligations which the industry supports in France. Under these conditions, it was impossible to renovate its equipment.

In order to allow of the necessary renewal of shipping material, Monsieur Marchegay proposed a solution which took account jointly of the legitimate claims of the Treasury and of the necessity for a permanent subsidy for shipbuilding, which was indispensable if a far-reaching result was to be achieved.

He discussed the situation of French shipbuilding in the light of the desire of seamen to be put on equal terms from all points of view with the personnel of land industries.

Finally, after an important interchange of views, the first Commission of the Congress adopted unanimously the following resolutions:—

1. That the industry must be governed by a stable régime, embodying a formula permitting of graduated assistance from the State, according to the needs of the moment, and taking account of the necessity for renewal of the fleet in the interests of external commerce and of national defence.

2. That appropriate measures in regard to collective agreements and legal obligations must be taken to put an end to incidents which, too frequently interrupting the regularity of sea services and the work at ports, are highly prejudicial to the industry.

On the following day consideration was given to the fishing industry and to the minor ports. In regard to the latter, resolutions were adopted, urging that their financial operation should be entrusted to the Chambers of Commerce, and that their maintenance by the State should be regularly and completely guaranteed by adequate budget credits.

A Paper was presented at the fourth meeting by Monsieur Peltier, of Marseilles, on port appliances, showing the development which had taken place in operative plant and giving technical details of this important department of port work.

Finally, at the last sitting the subject of Colonial ports came under review, and financial aid from the home country was recommended, particularly as regards development, the promotion of traffic and the lowering of transport rates between France and the overseas dependencies.

The New Free Port on Staten Island, New York

At a recent meeting of the Traffic Club of New York, Mr. John McKenzie, Commissioner for Docks at New York, reviewed the six months' operation of the Free Port or Foreign Trade Zone established at Staten Island in the early part of this year.

The zone in question is the first to be authorised in the United States by the Federal Government, and Mr. McKenzie explained that it is of the nature of an experiment.

During the short period of its operation, Mr. McKenzie said, the Dock Department has determined certain fundamental operations in foreign trade which it will benefit. He cited the case of manufacturers who use foreign raw material in their manufacturing processes and who, by using the foreign trade zone, may purchase large quantities of this material at an advantageous market price abroad, bring it into the zone and not have to pay duty on it until such time as it is actually withdrawn, either in part or altogether, for use.

Large losses to American importers are caused by the rejection of imported commodities by the customs authorities because of improper grading, but with the foreign trade zone in operation, it is now possible to re-grade shipments at the zone and enter them. Importation of foreign liquors in casks instead of bottles is another advantage. Liquors may now be brought in in casks, bottled at the foreign trade zone in American-made bottles by American labour and then re-shipped.

In the six months of its operation, \$140,000 worth of goods have been handled by the zone. This included copra from the Dutch East Indies for remarking and re-exporting, fur cuttings from Canada for re-labelling and re-export, watch-makers' supplies from Switzerland, tobacco from Turkey, woollens and braids from Europe and various other goods. It is the hope of the City of New York, the Commissioner added, to develop new trade from South America as one of the prin-

cipal functions of the zone, although so far most of the inquiries have come from Europe.

The privilege of manufacture is badly needed for the free zone. Under the present law, re-marking, re-labelling, re-sorting, re-grading and "manipulating" are permitted, but manufacturing is not allowed. The distinction between "manipulation" and manufacturing is a fine one, and it will be necessary to obtain a series of decisions from the customs courts in order to clarify the matter, but it is hoped that the manufacturing privilege may later be accorded to the zone.

Commissioner McKenzie reassured operators of bonded warehouses who have feared that the zone might divert business away from them. The sole purpose of the foreign trade zone is to develop new businesses for the port, not to divert it from warehouses, he said, adding: "If it doesn't bring new business I shall be the first to admit publicly that it is a failure."

The city has decided on private operation of the zone, he concluded, because of the fact that civil service restrictions would hamper the city in employing men to handle the business of the zone.

Salvage Feat on the Mersey.

A notable salvage feat has been accomplished in the outer estuary of the Mersey by the raising and docking of the "Clan Mackenzie" which, following a collision with the "Manchester Regiment" on October 23rd, drifted towards the Newcome Knoll off Hoylake, where she sank on the edge of the bank in approximately 35-ft. of water. After preliminary preparations, and in the face of considerable difficulties and risks from weather and other conditions, the vessel was ultimately towed into dock and successfully berthed. The operations were in charge of Captain H. V. Hart, the Marine Surveyor of the Mersey Docks and Harbour Board, to whose capable handling of the matter tribute was paid at a meeting of the Board on the 26th November.

The Public Works Exhibition, 1937

Exhibits of Interest to Port Authorities

(CONTRIBUTED)

The ninth Public Works, Roads and Transport Congress and Exhibition held at the Royal Agricultural Hall during the latter part of last month compared favourably with the previous exhibitions, both from the wide range and the practical utility of the exhibits.

Our review of some of the most interesting exhibits, from a dock and harbour point of view, gives an indication of the important position the equipment and maintenance of docks and harbours holds in our industries and manufactures. It is only possible, in this short survey, to describe very briefly a few of the many machines and appliances manufactured by firms who hold a world-wide reputation for the reliability and efficiency of the plant they supply to many countries.

C. H. Johnson & Sons, Ltd., had on view a patented Diesel Pile Driver (Prof. Seidl System). This machine embodies the very latest method, both for simplicity in operation and economical working. It is manufactured in weights, ranging from a falling ram of 6 cwt. up to 2 tons. Their Frog Rammer (Patented) is manufactured in 1 ton and $\frac{1}{2}$ ton sizes for the consolidation of large masses of earth, such as foundations, embankments, reservoirs, bridge abutments, etc. The Balanced Power Rammer is a self-contained earth-consolidating machine, and can also be used as a concrete breaker or light pile driver.

The 2-in., 3-in. and 4-in. Johnson Homelite Pumps are easy to start and operate, and owing to their light weight are readily transported and handled. They can pump 6,500, 12,000 and 32,000 gallons per hour respectively, and have a suction lift of 28-ft. This firm also displayed concrete vibrators, trench brace, pipe-laying winch and timber drawer.

Appleby-Frodingham Steel Co., Ltd., demonstrated "Frodingham Hoesch" Steel Sheet Piling. It is designed for one-piece piling and needs no separate locking bar. It claims to dispose the material to the best advantage, having regard to the stresses involved. There is no diminution of thickness at the lock, and the design of tongue gives exceptional strength at this point, particularly in resisting tension in the direction of the piling wall. All joints are flush and watertight. The piling is supplied in pairs or singly, with holes, if required, for slinging and facilitating withdrawal.

The British Steel Piling Co., Ltd., displayed Larssen Steel Sheet Piling, which is designed essentially for the construction of permanent retaining walls and similar structures. The shape of the sections is such as to combine great strength with minimum weight, and the piling has a highly-efficient interlock which permits it to be driven and withdrawn easily and without distortion. It has been used for important developments in engineering practice, and is applied to dock and harbour work, river protection and sea defence, bridges and buildings. The company also manufactures pile-driving plants and hammers of the Single-Acting and of the McKiernan-Terry types for use either with steam or with compressed air. The Vibro and Prestcore patented systems of cast in situ concrete piling are operated by the company, and in the photographs on their stand were included views of important bridges and buildings supported on piles of these types. "Wonder" Concrete mixers and B.S.P. Tubular Steel Scaffolding were also exhibited.

Tilbury Contracting & Dredging Co., Ltd., are Public Works Contractors, quarry owners, and tarred and bituminous macadam manufacturers. They have quarries or works at Inverkeithing (Fife), Maidstone, Norwich, Ipswich, Yarmouth, Lowestoft, Goole and Greenwich, London. Also at Maidstone, Kent, they have a special plant for the manufacture of Fillers and Impalpable Powders, samples of which were shown at the exhibition, together with samples of granite kerb and setts, bituminous macadam and asphaltic thin carpets, etc.

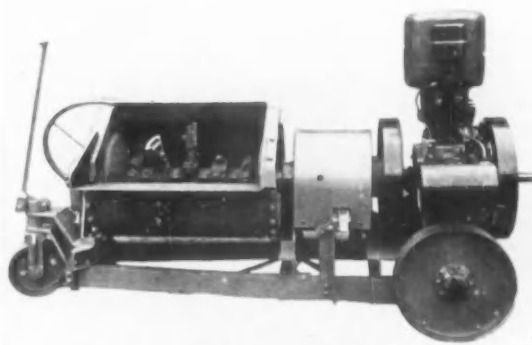
Ruston-Bucyrus, Ltd., Lincoln, showed an entirely new design of $\frac{1}{2}$ and $\frac{3}{4}$ cu. yard excavator. It is known as 17-RB when fitted with a $\frac{1}{2}$ cu. yard bucket and 19-RB with a $\frac{3}{4}$ cu. yard bucket, and has the following special features: Extra large caterpillar tracks having a large bearing area, with a low ground pressure; self-cleaning tracks and track rollers which clear themselves of dirt on soft ground; cast steel revolving frame with conical hook rollers, which dispense with centre post and consequent adjustment; two speed travelling; all main



17 RB Excavator.

machinery, shafts, drums and details mounted on ball or roller bearings; clutch adjustment and maintenance is simplified by new design of clutch which dispenses with servo clutches; main machinery is all mounted behind the centre of rotation, and the light weight, both in the base and main machinery and excavating equipment, gives increased working speed; all gears are mounted on splined shafts; the machine is easily and quickly convertible to shovel, dragline, dragshovel, skimmer, grabbing crane or crane; the boom and dipper arms are of all-welded construction, the shovel dipper is fitted to take renewable and reversible teeth of alloy steel; the dipper door is curved to obtain quicker and cleaner dumping; a common boom is fitted for skimmer and dragshovel equipment; an entirely new design of dragline bucket is supplied, fitted to take renewable and reversible teeth.

Stothert & Pitt, Ltd., included among their exhibits the Super-Seven and the Super-Five Victoria Mixer with a mixed batch capacity of 7 cu. ft. and 5 cu. ft. respectively. Each is fitted with an internal combustion engine, side-loader, water tank and spring-borne road truck. A Single Shaft Paddle Mixer of 4 cu. ft. capacity, complete with 8 b.h.p. Lister engine, and mounted on three-wheel truck with drawbar was also displayed, as well as a portable Bucket Loader, a machine which is particularly suited for loading sand, gravel, chippings, or coal.



Single Shaft Paddle Mixer. 4 cu. ft. capacity.

A special feature is the right and left-hand screw conveyors, which are mounted on the tail shaft; these screws excavate and feed the material to the elevator buckets. The machine is mounted upon four pressed steel travelling wheels, each fitted with twin rubber tyres; the front axle is arranged to swivel. The two rear wheels are driven through machine-cut spur reduction gear, and can be operated by hand when the machine is loading, or by power when required to travel from one dump to another. If it is necessary to move the loader a considerable distance, the clutch on the rear axle can be withdrawn and the machine coupled to a lorry.

William Jones, Ltd. included on their stand the "Panther" Excavator. It is their Light $\frac{1}{2}$ yard Machine, and a variety of such equipments of different sizes are available, while for very hard and difficult work the buckets can be adapted, both in design and size, to meet special requirements.

The Public Works Exhibition, 1937—continued

Priestman Bros., Ltd., the well-known manufacturers of dredgers, excavators and grabs, this year featured the "Cub" Excavator. This versatile excavator, weighing $7\frac{1}{2}$ tons with one attachment, and capable of excavating up to 40 cu. yds. an hour, can, by easy interchange of buckets, operate either



The "Cub" Excavator.

as a shovel, trencher, skimmer, "Teredo," grab or crane with the short jib, and when used with the long jib, it can likewise operate as a dragline, grab, drag scraper, "O'Byrne" scraper plate, pile driver or crane.

The Renold and Coventry Chain Co., Ltd., had on view two working model Conveyors. One conveyor was shown handling bulk material in various ways, so as to form a continuous conveying system. The material handled passed from an upper feed hopper on to a scraper conveyor, which carried it to the boot of a bucket elevator. This elevator picked up the material from the boot and discharged it into a second feed hopper, which was fitted with a mechanically-driven rotary feed device at its lower end. From the rotary feed the material passed into the buckets of a gravity bucket conveyor, which carried it back to the level of the upper feed hopper, into which it was returned by the action of a bucket tipper. The other model was shown handling wooden blocks (representing cases or packages) in various ways, so as to form a continuous conveying system. The blocks handled were carried along by a slat conveyor to the foot of a push-bar elevator. They were then picked up and carried to the top of the elevator by the push bars and fed on to a grid. From the grid they passed to the trays of a swing-finger tray elevator, and after being carried along to the starting point, were caught by a further grid and then fed back on to the slat conveyor. In addition were displayed other products manufactured by the Company. These included stock chain wheels, for both roller and inverted tooth chains, chain clutches, Renold chain couplings, Renold-Hardy flexible couplings, a Renold chain speed transformer, and a wide range of chains suitable for every type of power transmission and conveying and elevating.

T. C. Jones & Co., Ltd., included in their exhibits the "Super 8" Petrol Crane, together with the larger models capable of handling 12 cwt. and 1 ton. These models are easily operated, and are particularly useful on deep trenching work, tunnelling or basement excavations. The company also showed the new 6-in. and 5-in. centrifugal self-priming pumps coupled with Diesel engines. These pumps are mounted on robust chassis on four large diameter wheels, one pair of which swivel, to give a sufficient lock to make manoeuvring round corners, and in confined spaces easy. The self-priming arrangements are automatic, and it is possible, therefore, to leave these pumps working unattended as, if the sump is sucked dry, the pump will start pumping again as soon as the water rises above the foot level.

Elldée & Co. demonstrated the Lorret Truck, which has been specially designed for use in yards, docks, warehouses, goods and passenger stations, parks, etc. It can carry half-a-ton load, and also is easily capable of towing a trailer carrying a further half-a-ton. Low-built, ensuring quick and easy loading, stable

and easy to handle, it is ideal for work in confined spaces, as it will turn practically in its own length. The body is fitted with drop detachable sides and tailboard, and its internal measurements of body space are 6-ft. 2-in. by 3-ft. 5-in.; height 18-in.

Thomas Smith & Sons (Rodley), Ltd., exhibited their new Smith "Seven" Excavator. Its working weight is 7 tons, and it is easily convertible by interchange of front-end attachments



to work as a navvy shovel, skimmer, trencher, dragline, grab crane, crane and pile driver. There are only two jibs required for all these attachments, and the same bucket can be used for skimming and trenching purposes. The normal bucket capacity is $\frac{1}{4}$ cubic yard; larger capacity buckets are available for easily-worked materials.

The St. Lawrence Ship Channel

Official Date for Closing to Navigation

The Canadian Government have issued an announcement that the Department of Transport will, in future, discontinue the assistance of ice-breakers to shipping using the St. Lawrence channel above Three Rivers after December 1st.

Ships will not be prohibited from clearing from Montreal after this date, and possibly a few vessels will remain until the last minute, trusting to luck and the weather to get them out. However, the decision of the Department of Transport to take its ice-breakers out of service on December 1st is likely to have a deterrent effect on steamship operators, who have relied on the patrol service to assist their vessels to reach open water at the last possible moment.

The navigation season at Montreal has never been bound by any precise regulations. The season has opened whenever the first vessel has been able to get up the river, and closed in much the same fashion. There have been instances when the Government breakers have been kept working in the Montreal-Three Rivers stretch at the end of the season—sometimes as late as the second week in December—for one or two cargo ships. The ice-breakers have never left a ship stranded in Montreal, no matter how late, unless ice conditions were so severe that it was absolutely impossible to make a passage to the open sea.

Ottawa officials explain the decision as a step in the interests of shipping, which has taken unnecessary risks for years. Another reason is the expense involved in keeping two ice-breaking vessels in attendance in the upper stretch for days, waiting for a single cargo vessel to get clear of Montreal. The Government ships have often suffered damage by ice in the last few days of navigation.

The official announcement of Mr. R. K. Smith, Director of Marine Service, Department of Transport, runs as follows:—"Shipping and other interests concerned, using the St. Lawrence route, are hereby warned that the department discontinue the use of ice-breakers as a means of maintaining an open channel above Three Rivers to Montreal after December 1st in any year. Prior to this date, the ice-breakers will render any assistance possible to shipping, as in the past, weather and ice conditions permitting, and where undue risk to the ice-breakers concerned is not involved."